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An evaluation of the implementation of the Science-Technology and Society (STS) concept in Science Instruction in secondary schools in Zimbabwe

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Abstract

The study evaluated the implementation of the Science-Technology-Society (STS) concept during science instruction in secondary schools and the possible constraints to its implementation and the possible solutions the identified constraints.

The sample consisted of fifteen schools in Makoni District of Manicaland and involved all the Science Heads of department in the schools including five form four students per each sampled school. The total number of participants was ninety.

Data was collected using questionnaires, lesson observations and interviews. Results reflected great discrepancy between the intended and the actual implementation processes taking place in schools. The results show that the majority of the science teachers used the lecture method as opposed to the recommended child centered science teaching approaches. Half the numbers of the teachers are not well versed with the concept of STS. There is a critical shortage of science teachers. Lack of resources, staff development workshops and poor science infrastructure in schools are negatively affecting the implementation of science-technology-society education in the schools.

Introduction

Science-Technology-Society (STS) is an innovative approach to the teaching and learning of science in conjunction with modern technology. It advocates for moving away from traditional pedagogic approaches by insisting more in students understanding and doing science rather than in rote learning. Students are expected to use acquired skills to solve specific problems emanating from their societies. The approach advocates for more attention to be given to relating science to the world outside as well as to practical .This implies that STS calls for educating students so that they are able to apply science and technology (tools, knowledge, process and products) to solve problems in their environments. According to STS approaches, students should do science so as to be functional not to produce science graduates who are alien to their own society. For example, science graduates should be able to apply science and technology whilst at school, say to be productive, to grow their own food, to carry-out diseases preventive measures and to become self reliant or employed. The STS model's aim therefore lies in modeling school graduates for adaptability, for creating their own work in the informal sector or for producing school leavers equipped with not only academic skills but with a range of practical skills which make them functional citizen. STS treats education as the sole intellectual and physical tool which is responsible for preparing children for absorption into the world of work and for this reason the school science curriculum should be designed to provide "life-long education, to make children self-sufficient and productive in services deemed as needs by the society. According to Awokoya in UNESCO 1981, basic needs of African countries are food, housing, health, education, energy, transport and communication. In Zimbabwe such needs include agriculture, health, mining, environmental education, building industry and information technology education. STS education in schools should embrace the indigenous traditional skills, which in many countries can be developed and extended together with the new techniques which have to be recognized and understood. STS approaches to classroom practice recommends teaching approaches such as discovery method, problem solving, discussions, project methods, field trips and employing the philosophy of

constructivism (learning from the familiar/known to the novel/complex/unknown) (UNESCO, 1993). According to Freire, (1972), pupils should not learn to be mere depositories while the teacher is the depositor; such type of education is oppressive. In other words, Freire was advocating for implementation of STS concepts to teaching and learning processes. According to MOESC, Secretary's Circular Minute No.3 of 2002, one of Zimbabwe's science education policy goals reads, "The education system expects pupils to develop skills and competencies in science and technology". Such policy was directed to be implemented in both primary and secondary level education with effect from 1 January, 2002.

The purpose of this study

The purpose of this study was to evaluate of the implementation of the Science-Technology and Society (STS) concept during Science instruction in Makoni District secondary schools and the possible constraints to its implementation and the possible solutions to address the identified constraints.

Significance of the research

Findings from this study may be used to improve the teaching and learning of science in secondary schools, provide possible strategies for improving science classroom methodologies and provide useful information to policy makers on the implementation of the STS in the teaching and learning of science. Also research findings will help science teachers on how they can design STS instruction and hence become effective and efficient science teachers. There is very little literature on STS from the Zimbabwean authors. The research findings will contribute to the much needed STS data banks in libraries. To education inspectors, findings from this study will guide inspectors on what to look for when inspecting science teachers.

Literature Review

Linkage of Science-Technology-Society (STS)

Science is refers to systematic processes which are used by humans to obtain knowledge about nature, and to an organized body of knowledge about nature. Science is a dynamic and a creative activity.

Technology involves the development and use of materials, tools, and processes for solving human problems and helping to satisfy human needs and desires. Many of the products of technology help humans accomplish tasks that would otherwise be very difficult or impossible to carry out. Although technology provides many benefits, it also produces associated costs and risks. Science often uses and requires tools and processes developed by technology, and conversely, technology often employs principles, laws, theories, and processes developed by science. Technology is also a way of knowing, and is also a process of exploration and experimentation. Technology is both a form of knowledge that uses concepts and skills from other disciplines (including science) and the application of this knowledge to meet an identified need or to solve a specific problem using materials, energy, and tools (including computers). Technological methods consist of inventing or modifying devices, structures, systems, and or processes. Science and technology are closely linked, especially through the skills of scientific inquiry, technological problem solving, and communication. So science and technology forms a cyclic reaction. This implies that science, technology and society are closely linked, especially through the skills of scientific inquiry, technological problem solving, and communication. The world as we know it today has been affected in many ways by science and technology.

Reform movements in STS education

Universal reform movement in science and technology education "gave birth' to the paradigm of the STS approaches in the late 1950s in America. The reforms were partly prompted by the interest in America in strengthening science education, after the Russians beat the USA to send the first man to space. A new vision of science learning emerged and it was

called Science-Technology-Society approach to learning and teaching of science concepts. The new instructional strategies were far different from most traditional conceptualizations which centered on chalk-talk, teacher centered and rote learning classroom practices. The new approaches called for provision of hands-on, mind-on, and authentic learning experiences in science. This ousted the education system and curricula which had been introduced before the Second World War. Societal needs had changed hence the education system had to change also so that it was in line with new needs of society (Rosenberg, O'Donoghue and Olvitt, 2008), www.tessafrica.net, www.capeaction.org.za). STS's aimed at examining and implementing ways in which education in science and technology affected national development. It began with a consideration of the impact of science and technology on the individual, on the community and on the traditions and traditional beliefs of society. According to the STS approach, developing nation like Zimbabwe, its curriculum has to include science concepts such as biotechnology to improve yield and quality of agriculture products, study diseases and their preventive measures, job creation education, energy creation and communication in order to address the needs of Zimbabwean society. The science and technology curriculum to be offered must seek to foster individual characteristics such as curiosity, creativity and self-reliance, as well as preparing each student for life and work. The implementation of Education with Production (EWP) and tech-voc subjects by Zimbabwe after independence was done as a way of being in compliance with the STS concept. STS approaches seeks to examine the place of science and technology in education, how well science and technology serve as a driver of development in the society. The emphasis of STS is on relating learning to the immediate needs of the community in order to improve the quality of life.

Changes in biology through implementation of STS education

Trends brought in biology through implementation of STS on biology are concerned with the tools that have been developed to new levels of performance. These include the electron microscope, the ultracentrifuge, X-ray, crystallography and nuclear magnetic resonance. Rapid developments are currently being made in areas like cytology (e.g. concept of cell-surface receptors); in immunology, and in neuroscience, genetic engineering and in gene therapy just to mention a few areas. In neuroscience, for example, the study of cell-surface receptors has revealed the presence of hormone-like transmitters in the brain. Applications of biotechnology concepts to agriculture have increased agriculture yields drastically. Genetic engineering has managed to control many diseases such as sugar diabetes and has resulted in production of hybrid organisms and artificial creation of organisms (transgenic organisms) of which are of great beneficial to man. In brief, application of STS approaches in biology and other science subjects has made it possible for the human-race to live healthier, happier and more comfortable and interesting lives than those who lived in the past (Osborne, 1983).

Planned actions in Africa for facilitating STS concepts

Soon after independence, all African States regarded STS education as their first priority area to develop. Education has been treated as a major instrument for the social, economic, cultural and political modernization of the developing countries. The Conference of African States on the Development of Education in Africa held in Addis Ababa in 1961 made certain recommendations and set up certain education targets. One of the set objectives was a drive to quantitative scientific and technical education literacy.

With regards to science teaching approaches, the Lagos Conference recommended the adaptation of new pedagogical approaches. The recommendations included the introduction of science teaching in the early years of schooling, the use of more realistic science methods of practical and experimental work, and the production of new relevant teaching and learning materials which are suited to local conditions.

Trends of STS in Zimbabwe

In the context of science and technology education, the Harare Declaration noted that 'technical and vocational' education has not been sufficiently developed and that the attention given to agricultural education was found to bear no relation to the economic structure of the African countries. The teaching of science and technology was found to be introduced too late in school curricula and is seldom provided for adults in the context of out of school education. The resolution taken was to "develop and renovate science and technology teaching at all levels and have activities designed to popularize science among the general public, in order to promote full utilization of modern scientific and technological knowledge in development, to stimulate an interest in a scientific career and to increase the number of pupil students opting for work in scientific fields" (UNESCO, 1982).

Government and science-technology-society education in Zimbabwe

In response to provision of the infrastructure conducive to delivery of science education and technology, the Zimbabwean government embarked on a program to increase science Higher learning education institutions. Institutions such Bindura University of Science and Technology (BUSE), Higher Institute of Technology (HIT), Chinhoyi University of Technology (CUT), National University of Science and Technology (NUST), the conversion of Belvedere Teachers' College (BTT) into Belvedere teacher's Technical College) and the increase in poly technology colleges was a devotion by the government to ensure the provision of science education and technology to the society. All this was in line with what the Addis Ababa, the Tunis, the Dakar and the Harare declarations called for.

Benefits of STS education to society

As science for All Americans points out, good STS education help students to develop the understandings and habits of mind they need to become compassionate human beings able to think for themselves and to face life head on. STS education should equip them also to participate thoughtfully with fellow citizens in building and protecting a society that is open, decent, and vital. In short, science and technology have made it possible for people to live healthier, happier and much more comfortable and interesting lives than was previously possible. Scientific and technological knowledge has contributed, perhaps more than any other factor to the economic growth of both developed and developing countries.

The more science-literate citizens are, the stronger their society can be. Specifically, the lessons and skills science gives us can have repercussions that help make more responsible citizens, a strong economy, a healthier environment, and brighter future for everyone. The dominance of technology in society today reaffirms the modern philosophical orientations and necessitates that today's students achieve a level of scientific/technological literacy that will help them deal with science related societal issues for the improvement of their own lives and the advancement of the society at large. To achieve this specific recommendations have been formulated for instruction related to science-technology-society education.

Methodology

This study was to evaluate the implementation of the Science-Technology-Society (STS) concept during science instruction in secondary schools and the possible constraints to its implementation and the possible solutions the identified constraints.

A questionnaire for teachers to assess the teachers' knowledge about the STS, constraints to its implementation and the possible solutions the identified constraints was used. Another questionnaire was used to assess the Science Head of Department's knowledge about the importance of the teaching methods and how she or he monitors the teaching and learning STS. Lesson observations were also done in order to evaluate the implementation of STS in the teaching and learning of science.

Results

Table 1: Teachers' knowledge about STS in the teaching and learning of science

	Frequency	%
Knowledgeable	3	20
Not Knowledgeable	12	80

Table 2: Factors influencing the implementation of STS concept

Factors Identified	Frequency	Percentage
No guidelines on STS	9	60
Inadequate resources	13	87
Poor science infrastructure	7	47
Poor deployment of available resources	3	20
Large classes	15	100
Teachers computer illiterate	5	33

Table 3: Prevalence of science teaching methodologies

Teaching method	Teachers using this method during lesson observations
Lecture method	13
Problem solving method	1
Project method	0
Computer simulation	0
Practical demonstrations	1
Educational field trips	0

Table 4: Availability of resource in schools for efficient science teaching

	None	Inadequate	Adequate	In Excess	Total
Laboratory	60	10	5	0	75
Science	50	15	10	0	75
Science	50	15	10	0	75
Computers	65	10	0	0	75
Text books	0	55	15	5	75

Discussions and conclusions:

According to teachers implementation of STS in schools is being hindered by large classes. In such a situation teachers will concentrate on completing the syllabus so that they meet the immediate need of the pupil which is passing examinations. Inadequate resources contributed to poor implementation of the concept. The way students acquires knowledge during learning experience at school depend on the modes of teaching being applied by their teachers or mentors. Poor teaching methods are being employed which don't promote STS. Science lessons require hands-on-approaches. The lecture method was the commonly used teaching methods. STS methodologies advocate for use of teaching methodologies such as project method, computer simulation, educational trip which stimulated critical thinking and problem solving in students. Poor infrastructure such as laboratories and inadequate learning materials are hindering the implementation of STS concepts in the sampled schools. Teachers are not well versed with the concept of STS. Eighty percent of the teachers could not give a correct definition of the STS concept.

Research recommendations

The study makes the following recommendations:

The concept of STS should be given more attention in training science teachers in all teachers' colleges. The use of project method as a teaching approach should include assessment of pupils' projects as what is being done in subjects like Building Studies and Agriculture. It is

hoped that this will encourage teachers to implement the approach Guide lines on the implementation of STS approaches to learning must be made available to science teachers. Staff development workshops on STS approaches should be carried out at all levels (school, zonal, district) as refreshers to teachers who may not have a chance to be trained on STS in the past.

School Heads must be trained on implementation of STS approaches so that they can monitor efficiently and effectively the implementation of STS concepts in their schools. Education administrators must ways of improving science resources in the education system and finding possible ways of luring science teachers and reducing teacher pupil ratio for the science subject.

References

[1] Achinstein, B. & Villar, A. (2002). Politics of the Mentoring Process for Novices: Negotiating Professional Relationships and New Teacher Learning. Paper presented at the American Educational Research Association in New Orleans. P.A.P.E. CEP, Grahamstown. Rhodes University.

[2] Aikenhead, G. (2005). Science for everyday life: Evidence-based practice. New York:

[3] Aikenhead, G. and Solomon, J. (1994).Eds. STS Education: International Perspective on Reform. New York. Teachers College Press.

[4] Ary, D., Jacobs, L. C. and Razavieh, A. (1972). Introduction to Research in Education. London. Rinehart and Winston.

[5] Ausubel, D.P. (1968). Educational Psychology: A Cognitive View. Holt. Rinehart and Winston.

[6] Barker, R. (1990). Philosophies of Education: An Introductory Course. Harare. College Press.

[7] Bell, J. (1993). 2nd. Doing your research Project: A Guide for first-time researchers in Education Science. Buckingham. Open University Press.

[8] Borg, W. R. and Gall, M. D. (1989). Education Research: An Introduction. London. Longman.

[9] Business Herald of 28 / 12 /89. Harare.

[10] Business Herald of 28/12/89.

[11] Bybee, R. (1993b). Reforming Science Education: Social perspectives and Personal Reflections. Washington DC. Teacher's College Press.

[12] Chemistry, Vol. 19, Iss. 2 (2010)

[13] Chetsanga, C. J. (1994). Genetic diversity of Hepatitis B virus isolation in Zimbabwe. Journal. Med.vol.42:73-78.

[14] Chikwamba, R.K.. (1995). State of the art of Biotechnology Research in Zimbabwe.

[15] Circular Minute No. 2 of 2001. Zimbabwe. MOESC).

[16] Cohen, L. and Manion, L. (1980). Research Methods in Education. London. Croom Helm Ltd.

[17] David-de, V. (2002). 5th Ed. Surveys in Social Research. London. Routledge.

[18] Descombe, M. (1998). A Good Research Guide for small scale social Projects. Philadelphia. Open University Press.

[19] Duschl, R. (2008). Science education in three-part harmony: Balancing conceptual,

[20] Engestrom, Y. (1999). Innovative learning in work teams: Analysing cycles of knowledge creation in Practice. In Y. Engestrom, R. Miettinen & R.L.Punamaki (eds). Perspectives on Activity Theory. Cambridge. Cambridge University Press.

[21] Fensham, P. (2007). Policy issues for science education. Discussion paper prepared for epistemic, and social learning goals. Review of Research in Education, 32, 268-291.

[22] Fowler, F. J. (2002). 3rd Ed. Survey Research Methods. Thousand Oaks. Ca. Sage.

[23] Fraenkel, J. R. and Wallen, N. E. (1990). How to Design and Evaluate Research in Education. New York. McGraw-Hill Publishing Company.

[24] Freire, P. (1972). Pedagogy of the Oppressed. New York. Penguin Books Ltd

[25] Gagne, R.M. (1977). The Conditions of Learning. Holt. Rinehart and Winston.

[26] Gatawa, B.S.M. (1990). The Politics of the School Curriculum: An Introduction.

[27] Gay, L. R. (1979). Educational Evaluation and Measurement: Competencies for Analysis and Applicational Evaluation and Measurement: Toronto. Charles, E. Merrill.

[28] Geddis, A.N. (1993).Transforming Subject Matter Knowledge: The Role of Pedagogical Content Knowledge in

Learning to Reflect on Teaching. Intern. J. Sci. Educ. 15,673-683.
[29] Guilford, J. P. (1995). 4th Ed. Fundamental Statistics in Psychology and Education. New York. Education.
[30] Hammenet, 23 – 27 April 1999, Fifth General Conference of the African Academy of Science (Tunisia Declaration).
[31] http://echo.gmu.edu/center/
[32] http://mwl.merriam-webster.com/dictionary/technology
[33] http://science.howstuffworks.com/
[34] http://www.belugaschoolforlife.com/
[35] http://www.fundacionypf.org.or/indexn.html.
[36] http://www.project2061.org/tools/sfaaol/Intr.htm, http:www.nap.edu/readingroom/books/nses/html/action.html/action.html
[37] http://www.schoolforliife.org/en/index.html
[38] http://www.usak.ca/education/people/aikenhead/cvshort.htm. http://www.adre.edu.av./94pop/peacl.94257.txt.
[39] Jegede, Olugbemiro J., Peter A. Okebukola, and Gabriel A. Ajewole. (1991). "Computers and the Learning of Biological Concepts: Attitudes and Achievements of Nigerian Students". Science Education 75 (6): 701-06.
[40] Jokomo, E., Moyo, W.F., Ndowora, M.C., Mukwekwezeke, S.M., Madhowi, A.M., Ranganai,G.P., Hosking, B. and Groombridge, (1990) D.B. Handbook For Science Teaching. Harare. The Standard Control Unit of the Ministry of Education, Sport, Arts and Culture.
[41] Jones, M.G., Rua, M.J. & Carter, G. (1998). Science Teachers' Conceptual Growth within Vygotsky' Zone of Proximal Development. J. Res. Sci. Teaching 35, 967 – 985.
[42] Kelly, G. A. (1991). The Psychology of Personal Constructs: Vol. One. A Theory of Personality. London. Routledge.
[43] Leedy, P. D. (1985). Practical Research Planning and Design. New York. MacMillan Publishing Company.
[44] Machinga, G, Report presented to the cabinet in March 2000 on the Nziramasanga Commission findings.
[45] MODULE 6: New Technologies in Teaching and Learning in Higher Education. UNESCO-AFRICA.
[46] MOESC. Secretary's Circular Minute NO. 2 of 2001.
[47] Nkrumah, K. 1964. Consciencism. London. Heineman.
[48] Nwaboku, N.C. (1997). New information technologies in education and new roles for potential teachers. UNESCO-AFRICA 15/15, 30-37
[49] Okanlawon, A.E. (2010). Constructing a framework for Teaching reaction Stoichiometry using Pedagogical Content Knowledge. Nigeria. Department of Science, Technology and Mathematics Education.
[50] Osborne, D.G. (1983). A paper prepared for inclusion in Reflections on the Future Developments of Education. Paris. UNESCO.
[51] Parawira and Khosa. (2009). Scientific Research and Essay. Vol.(4).(9), pp. 825-841, September, 2009.
[52] Richards, L. (2008). Handling Qualitative Data. A Practical Guide. London. Sage Publications.
[53] Rosenberg, E., O'Donoghue, R. and Olvitt, L.(2008). Methods and Processes to support Change-Oriented Learning. Grahamstown. C.A.P.E. CEP, Rhodes University.
[54] Science-Technology-Society in the Science Curriculum. ERIC/SMEAC Special Digest No. 2.
[55] Sidhu, K. S. (1984). Methodology of Research in Education. New Delhi. Sterling Publishers.
[56] Solomon, J. and Aikenhead, G. (1994). STS Education: International Perspectives on reforms. New York. Teacher's College Press.
[57] Strotman cited in Teachers Forum, 1990. Vol 18: NO.3.
[58] Sutton, F. X. (1964). Africa's Educational Needs and Opportunities. Addis Ababa Conference, "man and Africa".
[59] Teacher's Forum. October 1989.
[60] The Herald, 4 October 2010
[61] The Lagos Plan of Action of 1980 (Science for the twenty-first century: A new Commitment.
[62] Tuckman, B. W. (1994). 4th Ed. Conducting Educational Research. New York. Harcourt Brace College Publishers.
[63] UNESCO (1993). Science & Technology Education and National Development. France. UNESCO.
[64] UNESCO, (1982). Harare Declation. Africa. Unesco.
[65] Van Dalen, D. B. (1979). Understanding Educational Research: An Introduction. New York. McGraw-Hill Book Company.

[66] White, B. (2000). Dissertation Skills for Business and Management Students. London. Continuum.
[67] World Conference on Science and Technology. Perth, Australia, 8-12 July.
[68] World Conference on Science. Budapest. Hungary. 26 June – 1 July 1999.
[69] www.capeaction.org.za
[70] www.ru.ac.za
[71] www.tessafrica.net.
[72] Yager, R.E. (1996). Science/technology/society as reform in Science, technology and society: Albany, NY: State University of New York Press.
[73] ZIMSEC. (1998) Biological Sciences: Report on the June 1998 Examinations. Mt Pleasant. Zimsec.
[74] ZIMSEC. Syllabi (5006, 5008 and 5009), Harare. ZIMSEC.

Study of Association between Psychological Stress and Depression among Undergraduate Medical Students from Asia Metropolitan (Amu) in Johor Bahru

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Abstract

Background: *Stress is a term that refers to the sum of physical, mental and emotional strains or tensions on a person. Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. Psychological Stress among medical students is common as compared to other professional courses. The aim of the study is to study the association between Psychological Stress and Depression among undergraduate medical students in Asia Metropolitan University.*

Methods: *A Cross sectional study was undertaken among 75 medical students in a private medical college, Johor Bahru. Validated questionnaires such as General Health Questionnaire (GHQ -12) and Beck depression Inventory (BDI) were used to screen Psychological Stress and Depression respectively.*

Results: *Prevalence of Psychological Stress was 39.7% and Depression was 38.2% among medical students. There was a significant association between Psychological stress and Depression among medical students because the p-value <0.01.*

Conclusion: *Emphasize should be laid on the importance of screening for Depression of medical students on a regular basis for early detection and rendering appropriate intervention like student Mentorship Program, group counseling, stress management training to protect the future professionals.*

Introduction

Emotional disorder, one of the common human emotional states is defined as feelings of sadness and tiredness in response to life events, such as disappointments. It is one of the major problems among students and although it consists of more than half of all mental disorders, it is often left untreated each year worldwide. (Sidik, Rampal, & Kaneson, 2003).

Medical school is recognized as a stressful environment that often exerts a negative effect on the academic performance, physical health and psychological wellbeing of the student. Medical education across the globe is perceived as being inherently stressful.

According to World Health Organization (WHO), Depression is estimated to affect 350 million people. The World Mental Health Survey conducted in 17 countries found that on average about 1 in 20 people reported having an episode of Depression in the previous year.

Lifetime prevalence rates of Depression range from approximately 3% in Japan to 16.9 % in the United States, with most countries falling somewhere between 8 to 12 %. (World Federal for Mental Health, WHO, 2012). The prevalence of Depression in Malaysia was estimated to be between 8 to 12%. (Guan, N.G., 2014).

Background Information on study

Stress is a term that refers to the sum of physical, mental and emotional strains or tensions on a person. Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. Psychological stress among medical students is common as

compared to other professional courses. (Solanky, Desai, Kavishwar, & Kantharia, 2012; Kittu & Patil, 2013).

There are very few studies on stress among medical students in Malaysia. Therefore, it becomes important to study the overall mental health status and prevent the ill effects of Depression among medical students as these constitute neglected public health problem in Malaysia.

The aim of the study is to study the association between Psychological Stress and Depression among undergraduate medical students in Asia Metropolitan University.

General objective

To study the association between Psychological Stress and Depression among undergraduate medical students from Asia Metropolitan University (AMU), Johor Bahru.

Specific Objective

1. To determine the prevalence of Psychological Stress and Depression among medical students.
2. To determine the most common symptoms of Psychological Stress among medical students.
3. To determine the level of Depression among medical students.
4. To determine the correlation between Psychological Stress with Depression among
5. medical students.

Hypothesis

There is no significance association between Psychological Stress with Depression among medical students.

Literature Reviews

In this part, relationship of association between Psychological Stress, Depression and related factors reviewed to introduce an overview about mental status of medical students. Several previous studies in this field also reviewed and used as references.

Various stress factors reported in studies among medical students are academic demands, exams, inability to cope, helplessness, increased psychological pressure, mental tension and too much work load. The transition from pre-clinical to clinical training has also been identified as a crucial stage of medical school regarding student stress. Different studies conducted worldwide among medical students have reported prevalence of Stress ranging from 27-73%. (Solanky, Desai, Kavishwar, & Kantharia, 2012; Kittu & Patil, 2013; Basnet, Jaiswal, Adhikari, & Shyangwa, 2011 ; Sultana, 2011).

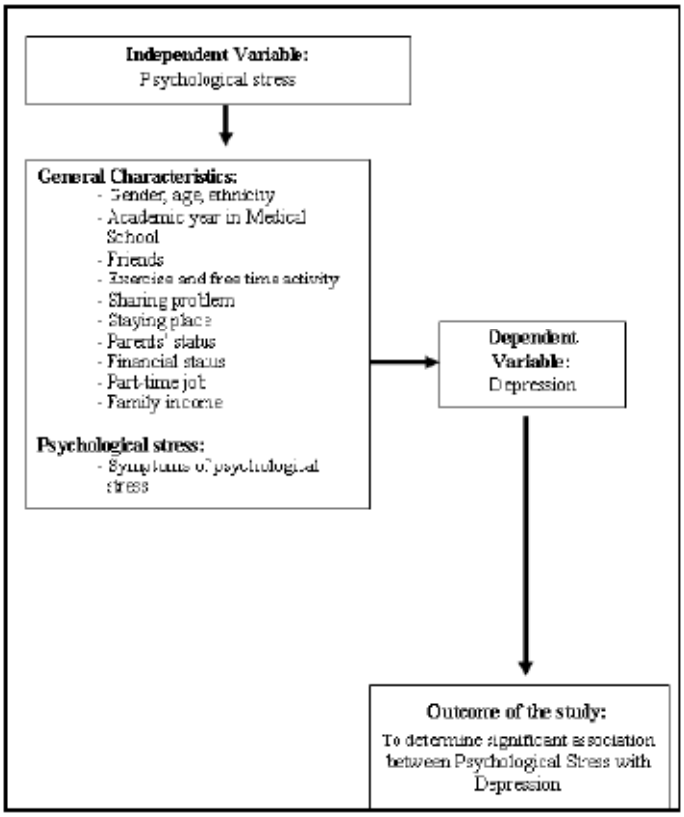
Most of studies used a self-administered instrument similar to the General Health Questionnaire (GHQ-12)to screen for symptoms of Psychological Stress. This instrument consists of 12 questions. Another questionnaire, the Beck Depression Inventory (BDI) was also used to screen for Depression among the respondents. The validated questionnaire consisted of 21 questions. It is a subjective scale used for screening purpose which has to be further evaluated to confirm the diagnosis. In its current version the questionnaire is designed for individuals aged 13 and over, and is composed of items relating to symptoms of Depression in last two weeks. (Kittu, D. & Patil, R. (2013); Solanky, Desai, Kavishwar, & Kantharia, 2012; Jourdan, & Mannix-McNamara, 2014)

There were also studies done in Malaysia from public and private universities. The studies were done to determine the prevalence of depression among medical students. The cross-sectional study design was used. The Beck Depression Inventory (BDI) was used as a screening Instrument among all medical students of University Putra Malaysia (UPM)and University of Malay at the Faculty of Medicine and Health Sciences. The prevalence of Depression among medical students was high. Early detection of this condition is important to prevent Psychological morbidity and its unwanted effects in medical students and young

doctors. (Sidik, Rampal, & Kaneson, 2003; Guan, 2014; Sherina, & Kaneson, 2003; Othman, Farooqui, Yusoff, & Adawiyah, 2013).

Apart from that, Community Medicine Department, International Medical School, Management and Science University (MSU) and International Medical University (IMU), Malaysia. These studies a significant difference was found between depressed with nondepressed and anxious with non-anxious students' experience of stressors due to frustration, change, and their emotional reaction to stressors. Overall, depressed and anxious students were found to experience more stress and react differently to stressors compared to non-depressed and non-anxious students. (Saravanan, & Wilks, 2014; Ahmed, & Hamoud, D, 2012).

Conceptual Framework



Methodology

Research Approach and Design

A quantitative approach was selected to conduct this study. One of the most common and well known study designs is the cross-sectional study design. In this type of research study, either the entire population or a subset population selected and from these individuals, data collected which helped to answer the research questions of interest (Olsen, C. & George, D.M., 2004).

Research Setting

This study involved students from two places:

1. 1. Preclinical students (Year 1 and Year 2)at Masai, Johor Bahru.
2. Clinical students (Year 3 and Year 4) at Muar, Johor Bahru.

The Study Population and Sample

This study population consisted of medical students from Asia Metropolitan University (AMU). They were selected as subjects for this study.

The sample size used in data collection as below:

Year 1 : 21 students
Year 2: 17 students
Year 3: 22 students
Year 4: 15 students

The total sample size was 75 students.

Data Collection

A questionnaire used as data collection instrument. Data were collected with the aid of mailed questionnaires to determine the association between Psychological Stress and Depression among medical students:

Validated Questionnaires were used in this study:

General Health Questionnaire (GHQ-12):

Sensitivity (81.3%)
Specificity (75.3%)

Beck Depression Inventory (BDI):

Sensitivity (88.2%)
Specificity (92.1 %)

(Yusoff & Rahim, 2009; and Karen & Autum, 2011)

The questionnaires consisted of only closed-ended questions. The subjects required to answer only one option for each question. The questionnaires prepared in English language because all the medical students are well verse in English.

The questionnaires consisted of PART 1, PART 2 and PART 3 (APPENDIX A).

PART 1 aimed for gaining information on **General Characteristics of medical students such as:**

- Gender, age, ethnicity
- Academic year in Medical School
- Friends
- Exercise and free time activity
- Sharing problem
- Staying place
- Parents' status
- Financial status
- Part-time job
- Family income

PART 2 aimed to determine **Psychological Stress based on the General Health Questionnaire (GHQ-12)** to screen for common symptoms of Psychological Stress among medical students such as:

- Unable to concentrate
- Lost sleep over worry
- Unable to play useful part in things
- Not able to make decisions
- Unable to overcome difficulties
- Unable to enjoy normal activities
- Unable to face problems
- Feeling unhappy and depressed
- Losing confidence in once self
- Thinking of own self as worthless
- Unable to feel reasonably happy
- Constantly under strain

Classification Psychological Stress based on bimodal scale:

0 – No more than usual;
0 – Not at all;
1 – Rather more than usual;
1 – Much more than usual.

Total score ranges from 0 -12.

A score of 4 and above is considered positive for Psychological Stress.

PART 3 consists of 21 groups of statements **based on Beck Depression Inventory (BDI). The** respondents are required to best describe their feeling during the past two weeks. This part is mainly to determine the level of Depression among medical students. Examples of groups of statement as below:

- Sadness
- Pessimism
- Past Failure
- Loss of Pleasure
- Guilty Feelings
- Punishment Feelings
- Self-Dislike
- Self-Criticalness
- Suicidal Thoughts or Wishes
- Crying
- Agitation
- Loss of interest
- Indecisiveness
- Worthlessness
- Loss of Energy
- Changes in Sleeping Pattern
- Irritability
- Changes in Appetite
- Concentration Difficulty
- Tiredness or Fatigue
- Loss of Interest in Sex

Classification of level of Depression based on scoring

1–10 Normal
11–16 Mild mood disturbances
16–20 Borderline depression
21–30 Moderate depression
31–40 Severe depression
Over 40 Extreme depressions.

(Kittu & Patil, 2013)

Data Analysis

After data collection, all the data organized and analysed. For analysis of the questionnaires, Statistical Package using Micro Soft Excel and Computer Program called Statistical Package for Social Science (SPSS) Student Version 18 used. The data analysed by using descriptive statistics.

There were few tables prepared to analyse the results.

1. The prevalence of Psychological Stress and Depression among medical students
   - Using proportion (percentage)
2. General characteristics of medical students
   - Using proportion (percentage)
3. Common symptoms of Psychological Stress among medical students

- Using proportion (percentage)

4. Level of Depression among medical students
   - Using proportion (percentage)
5. Correlation between symptoms of Psychological stress with Depression
   - Using Pearson Correlation to determine significant p-value.

Ethical Consideration

Prior to data collection, permission were obtained from the concerned authorities of medical school to conduct the study. An informed consent was obtained from students.

Permission to conduct this study obtained from the Medical Research Ethical Consent Board of Asia Metropolitan University (AMU).

Results

The results were analyzed by using Statistical Package using Microsoft Excel and Computer Program called Statistical Package for Social Science (SPSS) Student Version 18. Through this programme, our results were schedule in tables.

Total respondent are as follows:

Table 1: The total number of respondents from data collection

Year of Medical school	**Number of students**
1	21
2	17
3	21
4	9
Total Number of students	**68**
Response rate	**90.7%**

There are six categories were used to analyze the results

Category 1:
Prevalence of Psychological Stress among medical students

Category 2:
Prevalence of Depression among medical students

Category 3:
Common Categories related to general characteristic of medical students.

Category 4:
Percentage of common Symptoms of Psychological Stress among medical students

Category 5:
Percentage of Level of Depression among medical students

Category 6:
Pearson correlation of Psychological stress and Depression among medical students

Out of 75 medical students, 68 students participated and completed the questionnaires. The overall response rate was 90.7%. Out of the 68 respondents, table 2 shows 27 students (39.7%)were positive for Psychological Stress and from these students table 3 shows 26 students (38.2%)were shown to be depressed.

Table 4 shows, out of the 27 students, 9 (33.3%)males and 18 (66.7%)were females. The overall age ranged from 20 to 30 years. Majority of respondents were Chinese 16 (59.3%) followed by Indians 8 (29.6%), Malays 2 (7.4%) and Sikh 1 (3.7%). The second year medical students were found to experienced Psychological Stress and Depression.

Table 2: Percentage of Prevalence of Psychological Stress among medical students

Category	Percentage (%)
Psychological Stress	27 (39.7%)
No Psychological Stress	41 (60.3%)

Table 3: Percentage of Prevalence of Depression among medical students

Category	Percentage (%)
Depression	26
(38.2%)	No Depression

Table 4: Common Categories related to general characteristic of medical students

Characteristic	Categories	Psychological Stress (N=27, 39.7%)		Depression (N=26, 38.2%)	
Gender	Male	9	(33.3%)	9	(34.5%)
	Female	18	(66.7%)	17	(65.4%)
Ethnicity	Malay	2	(7.4%)	2	(7.7%)
	Chinese	16	(59.3%)	15	(57.7%)
	Indian	8	(29.6%)	8	(30.8%)
	Others (Sikh)	1	(3.7%)	1	(3.8%)
Academic in Medical School	First Year	8	(29.6%)	8	(30.7%)
	Second Year	10	(37.0%)	9	(34.6%)
	Third Year	7	(25.9%)	7	(26.9%)
	Fourth Year	2	(7.5%)	2	(7.8%)
Total household income per month	RM 499 and below	0	(0.0%)	0	(0.0%)
	RM 500-RM 999	0	(0.0%)	0	(0.0%)
	RM 1000-RM 1499	2	(7.4%)	1	(3.8%)
	RM 1500-RM 1999	1	(3.7%)	1	(3.8%)
	RM 2000-RM 2499	4	(14.8%)	4	(15.5%)
	RM 2500-RM 2999	3	(11.1%)	3	(11.5%)
	RM 3000-RM 3499	4	(14.9%)	4	(15.5%)
	RM 3500-RM 3999	1	(3.7%)	1	(3.8%)
	RM 4000-RM 4499	2	(7.4%)	2	(7.7%)
	RM 4500-RM 4999	3	(11.1%)	3	(11.5%)
	RM 5000 and above	7	(25.9%)	7	(26.9%)

Table 5 shows the most common symptoms of Psychological Stress among medical students. Majority of medical students were feeling not able to make decisions (32.4%), feeling unhappy and depressed (30.9%), unable to play useful part in things (29.4%), constantly under strain (29.4%), unable to concentrate (26.5%)and lost sleep over worry (26.5%)

Table 5: Percentage of common Psychological Stress symptoms among medical students

Common Symptoms of Psychological Stress	Percentage (%)
Not able to make decisions	22 (32.4%)
Feeling unhappy and depressed	21 (30.9%)
Unable to play useful part in things	20 (29.4%)
Constantly under strain	20 (29.4%)
Unable to concentrate	18 (26.5%)
Lost sleep over worry	18 (26.5%)
Losing confidence in once self	17 (25%)
Unable to enjoy normal activities	15 (22.1 %)
Unable to overcome difficulties	13 (19.1%)

Unable to feel reasonably happy	13 (19.1%)
Unable to face problems	12 (17.6%)
Thinking ownself as worthless	12 (17.6%)

Table 6 shows the level of Depression among medical students according to their grade. The overall prevalence of Depression among medical students was 38.2%.

The prevalence of Depression includes borderline and moderate Depression. There was no severe and extreme Depression among medical students. However, 7.3% of students were in mild mood disturbance.

Table 6: Percentage of Level of Depression among medical students

Level of Depression	**Percentage (%)**
Normal	37 (54.5%)
Mild mood Disturbance	5 (7.3%)
Borderline Depression	10 (14.7%)
Moderate Depression	16 (23.5%)
Severe Depression	0.0
Extreme Depression	0.0

Based on Pearson Correlation, the p-value (<0.01)between Psychological Stress and Depression. Table 7 proved there was a significant association between Psychological Stress with Depression among medical students.

Table 7: Pearson Correlation of Psychological Stress and Depression among medical students

Correlations

		Scoring Symptoms of Psychological Stress	Scoring for level of Depression
Scoring Symptoms of Psychological Stress	Pearson Correlation	1	.828**
	Sig. (2-tailed)		.000
	N	68	68
Scoring for level of Depression	Pearson Correlation	.828**	1
	Sig. (2-tailed)	.000	
	N	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

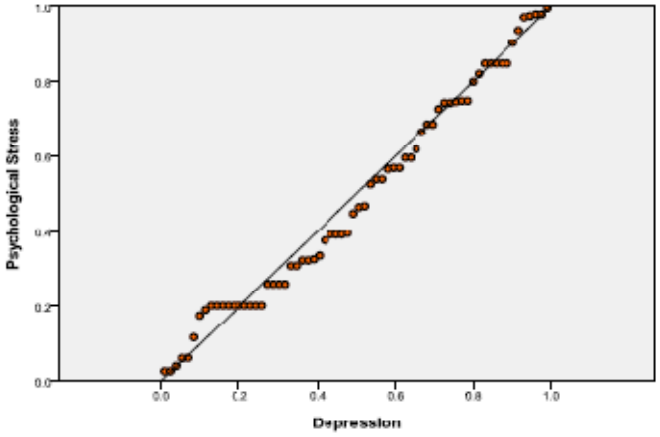


Figure 7: Pearson Correlation between Psychological Stress and Depression among medical students

Discussion

The academic atmosphere in medical colleges is very stressful which promotes competition among learners rather than co-operation. High level of stress among medical students has been reported in various studies. The personal and social sacrifice that the students have to make in order to maintain good academic results in a highly competitive environment puts them under a lot of stress which may end up in wide spectrum of psychological disorders like depression, anxiety, stress and many more. (Solanky, Desai, Kavishwar, & Kantharia, 2012; Sherina, Med, Rampal, & Kaneson, 2004).

The student experience of today is very different to that experienced in the 1960s, 1970s or 1080s. Recent research in United Kingdom indicates that mental health or psychological problems within student's populations are as high as 40%, with most students suffering from depression and anxiety, or both. Many respondents expressed the opinion that the number of students with mental health problems was increasing and that the severity of their problems was also increasing.

Apart from that, a study done by Yusoff and Yee, 2013 on prevalence and sources of stress among medical students in University Sains Malaysia (USM) and University Malay had found that the prevalence of psychological stress among medical students of USM and UM was 25.9%. Where else, another study done by Kittu & Patil, 2013 on association of Psychological Stress and Depression among undergraduate medical college, Pondicherry shows the prevalence of Depression was 28.9% among medical student. (Yusoff and Yee, 2013; Kittu & Patil, 2013)

The present study found that the prevalence of Psychological stress was 39.7% and Depression was 38.2% among medical students which corresponds to other studies. (Mosley, Perrin & Neral, 1994; Ko, Kua, & Fones, 1999; Wolf & Kissling, 1984; Manjunath & Kulkarni, 2013)

This study found the most common symptoms the medical students complained of were feeling not able to make decisions (32.4%), feeling unhappy and depressed (30.9%), unable to play useful part in things (29.4%), constantly under strain (29.4%), unable to concentrate (26.5%) and lost sleep over worry (26.5%) were all significantly associated with depression. Our result where compared with study done by Kittu & Patil, 2013 on association of Psychological Stress and Depression among undergraduate medical college, Pondicherry. This study proved the most common symptoms the medical students complained of were unable to feel reasonably happy (81.7%), unable to face problems (80.9%), unable to enjoy normal activities (75.3%), not able to make decisions (62.6%), unable to concentrate (54.5%), and constantly under strain (54%). There were three symptoms found to be the most common which was not able to make decision, unable to concentrate and constantly under strain. (Kittu & Patil, 2013)

Our study proved the levels of Depression among medical students are under borderline Depression (14.7%) and moderate Depression (23.5%) where else if compared with another study done by Kittu & Patil, 2013, they confirmed that moderate Depression (25.1 %) and severe Depression (3.8%) were found to be under the level of Depression among medical students. (Kittu & Patil, 2013).

Our study confirmed the second year medical students to have more Psychological stress and Depression. This is due to their final year professional exam in one month time. The students are under constantly strain due to vast syllabus, fear of failure, tight schedule and tough topics.

Based on Pearson correlation, there is a significant association between symptoms of Psychological Stress and Depression among medical students because the p-value was <0.01. There were few studies supports this present study which shows significant association between Psychological stress and Depression. (Solanky, Desai, Kavishwar, & Kantharia, 2012; Kittu & Patil, 2013; Guan, 2014; Do, 2007; Sherina & Kaneson, 2003; Bataineh, 2013; Saravanan, & Wilks, 2014).

The reason for high percentage of symptoms being reported by medical students could be a result of the students' awareness of symptoms of stress. However, under reporting of these symptoms could be due to ignorance on the part of students that these symptoms are related to depression, and can be treated. A larger study can be undertaken to confirm these findings.

Conclusion

Prevalence of Psychological Stress was 39.7% and Depression was 38.2% among medical students.

The most common symptoms among medical students was feeling not able to make decisions (32.4%), Feeling unhappy and depressed (30.9%), and unable to play useful part in things (29.4%) constantly under strain (29.4%), unable to concentrate (26.5%) and lost sleep over worry (26.5%)

The levels of Depression among medical students are under Borderline Depression (14.7%) and Moderate Depression (23.5%).

There is a significant association between Psychological stress and Depression among medical students because the p-value <0.01.

Recommendation

Student Mentorship Program and counseling session:

- To offers consultation to students from academic staff and senior medical students.

Modifying the curriculum and study environment:

- The purpose of the modification in the curriculum is mainly to achieve a balance between the content and time distribution among medical students.

Limitation

This study is a cross-sectional study, so cause and effect relationship of Psychological morbidity with other factors could not be established. The scale we screened for Depression was a self reporting subjective scale; therefore the scores can be easily exaggerated or minimized by the person completing them. Therefore, it can be evaluated by further studies in depth by qualitative methods.

References

[1] Abraham, R.R., Zulkifli, E.M., Zi Fan, E.S., Xin, G.N. & Geok Lim, J.T.(2009). A Report on Stress among First Year Students in an Indian Medical School. Malaysia, 3(2), 78-8.

[2] Ahmad, A. & Mazlan, N.H. (2014). Stress and Depression: A Comparison Study between Men and Women Inmates in Peninsular Malaysia. Malaysia, 4(2), 153-160.

[3] Ahmed, R., & Hamoud, D. (2012). Prevalence and Associated Factors of Emotional Disorder among Malaysian University Students. Malaysia, 4(12), 1401 -1411.

[4] Azila-Gbettor, E.M., Atatsi, E.A., Danku, L.S. & Soglo, N.Y. (2015). Stress and Academic Achievement: Empirical Evidence of Business Students in a Ghanaian Polytechinic. Ghana, 2 (4), 78-98.

[5] Bataineh, M.Z. (2013). Academic Stress among undergraduate students: The case of education faculty at King Saud. Sudia Arabia, 2(1), 82-86.

[6] Basnet, B., Jaiswal, M., Adhikari, B. & Shyangwa, P.M. (2011). Depression among Undergraduate Medical Students, Kathmandu University Medical Journal, 10(3), 56-59.

[7] Burn, N. & Grove, S.K. (2005). The practice of nursing research: Conduct, critique and utilization. Philadelphia: Saunders.

[8] Deasy, C., Coughlan, B., Pironom, J., Jourdan, D. & Mannix-McNamara, P. (2014). Psychological Distress and Coping amongst Higher Education Students: A Mixed Method Enquiry. Ireland, 9(12), 1 -23.

[9] Do, Q. D. (2007). Depression and stress among the first year medical students in University of Medicine and Pharmacy. Vietnam, 1 -106.

[10] Guan, N.G. (2014). A Review of Depression Research. Malaysia, 69, 42-45.

[11] Hysenbegasi, A., Hass, S. L., Rowland, C. R., (2005). The Impact of Depression on the Academic Productivity of University Students. New York, 8, 145-151.

[12] Khan, T.M., Sulaiman, S.Y.S. & Hassali, M. A. (2009). The causes of depression. A survey among Malaysians about perception for causes of depression. Malaysia, 2(2), 6-9.
[13] Kittu, D. & Patil, R.(2013). Study of association of psychological stress and depression among undergraduate medical students. India. 4(4), 555-558.
[14] Ko, S.M., Kua, E.H, & Fones, C.S. (1999). Stress and the undergraduates. Singapore, 40, 627– 30.
[15] Lama M. (2011). The Relation of Depression and Anxiety in Academic Achievement among Group of University Students. Tafila, 3(5), 96-100.
[16] Manjunath, R., & Kulkarni, P. (2013). Mental Health Status and Depression among Medical Students. Mysore, 4(1), 50-3.
[17] Mosley, T.H., Perrin, S.G., & Neral, S.M. (1999). Stress, coping and well-being among third year medical students. Unites State, 69, 765-7.
[18] Olsen, C. & George, D. M. (2004). Cross-Sectional Study Design and Data Analysis. Washington.
[19] Othman, C.N., Farooqui, M., Yusoff, M.S. & Adawiyah, R. (2013). Nature of Stress among Health Science Students in a Malaysian University. Malaysia, 105, 249 – 257.
[20] Polit, D.F., & Hungler, B.P. (2013). Nursing research: Principles and methods. Philladelphia: Lippincott.
[21] Richard, I.L. (2010). A Survey of Depression among Graduate Students and Their Academic Performance. Philippines, 2-47.
[22] Ross, S.E., Bradley, C.H. & Teresa, M. (2008). Sources of Stress among College Students. Midwestern. 33 (2), 1 -6.
[23] Salam, A., Yousuf, R., Abu Bakar, S.M. & Mainul Haque, M. (2013). Stress among Medical Students in Malaysia: A Systematic Review of Literatures. Malaysia, 20(6), 649– 655.
[24] Saravanan, C. & Wilks, R. (2014). Medical Students' Experience of and Reaction to Stress: The Role of Depression and Anxiety. Malaysia, 1 -9.
[25] Shah, M., Hasan, S., Malik, S., Sreeramareddy, C.T. (2010). Perceived stress, sources and severity of stress among medical undergraduates in a Pakistani medical school. Parkistan, 10 (2), 1 -8.
[26] Shendarkar, A.T. (2013). A Study of Stressors in Medical College Students (Hostelities) in Northern Maharashtra. India. 35 (3), 227-229.
[27] Sherina, M.S. & Kaneson, N. (2003). The Prevalence of Depression among Medical Students.
Malaysia. 11(1), 12-17.
[28] Sidik, S.M., Rampal, L. & Kaneson N.(2003). Prevalence of emotional disorders among medical students in a Malaysian university. Malaysia, 2, 213–217.
[29] Sohail, N. (2013). Stress and Academic Performance among Medical Students. Lahore, 23 (1), 67-71.
[30] Solanky, P., Desai, B., Kavishwar, A., Kantharia, S.L. (2012). Study of psychological stress among undergraduate medical students of government medical college, Surat. Gujarat, 1(2), 38-42.
[31] Sreeramareddy, C.T., Shankar, P.R., Binu, V.S., Mukhopadhyay, C., Ray, B., & Menezes, R. (2007). Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal. India, 7(26), 1 -8.
[32] Sultana, N. (2011). Stress and Depression among undergraduate Medical Students. Bangladesh, 2 (1), 6-9.
[33] Wolf, T.M., Faucett, J.M., & Randall, H.M. (1990). A health promotion program for medical students: Louisiana State University Medical Centre. United State, 4, 193– 202.
[34] Yusoff, M.S. & Esa, A.R. (2011). Stress Management for Medical Students: A Systematic Review. Malaysia, 477.

Relationship between Anthropometric parameters and Physical fitness in learners with visual impairment at the University of Jos

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Abstract

Physical activity plays an important role in prevention of chronic diseases; insight into the interaction between physical activity and health need to be quantified. The research goal was to investigate relationship between anthropometric parameters and physical fitness in learners with visual impairment. Twenty one male students with various degree of visual impairment participated (aged: 24-51 years) and tested on (1) six anthropometric predictors, including body weight, body height, body mass index (BMI), waist circumference, hip circumference and waist-to hip ratio (WHR), and (2) five Physical Fitness Factors (PFF) measuring: Heat rate, Systolic Blood Pressure, Diastolic Blood Pressure, right and left grip strength, flexibility and Aerobic endurance. Correlation and survey research design was adopted for the study. Descriptive statistic (mean, S.D) and inferential statistic (Pearson correlation and regression) were computed with SPSS version 20. Linear ($y = a + bx$) and multiple linear ($y = a + b_1x_1 + b_2x_2 \ldots b_nx_n$) equations were calculated to determine the degree of association and predict PFF from respective anthropometric variables. All anthropometric parameters produced an extremely weak relationship with physical fitness factors. In this study, no association is found between body weight and systolic blood pressure, no relationship between hip circumference and static right grip strength. Considering the goal of this research, it is concluded that there is a significant relationship between health's related anthropometric measure and physical fitness factors. Then we can use these measurements to predict values in any of the physical fitness components because the techniques are non-invasive and cost effective.

Key words: physical fitness, waist to hip ratio, anthropometric, flexibility.

Introduction

Health is defined by the World Health Organization as a state of complete physical, mental and social wellbeing, not merely the absence of disease or infirmity. Physical fitness has a close link with physical health, without health one cannot gain full physical fitness (Jaafari, 2012). Anthropometry is from a branch of science called "anthropology", it is anon invasive method to measure different part of the body, in terms of size, proportion and composition of the human body. Moreover, since the growth in children and body dimensions at all ages reflect the overall health and welfare of individuals and populations, anthropometry may also be use to predict performance, health and survivals (WHO, 1998)

Taylor, Mazzone and Wnutniak (2005) emphasized that the influence of morphological status on different performance variables are known to be directly related to overall physical routine, health status, and in independent living and quality of life. Physiological indices or profiles are markers that could predict presence or absence of major disease or illness.

Despite global awareness and interest in physical fitness for everyone, opportunities for people with disabilities in fitness programs remain quite limited (Miller, 1995), especially in

developing nations with higher dismal picture. Earlier researcher has shown that children who are impaired consistently exhibited lower levels of fitness than their sighted peers (Blessing & Mccrimmon, 1993). In the same vein, studies have regularly investigated the influence of different anthropometric dimensions and measures in relation to physical performance variable (Keogh, Hume, Pearson & Mellow, 2009). In this part of the world there is dearth of empirical studies to show this clear assumption especially among the visually impaired.

Visual Impairment (VI) is a global public health problem (Thylefor & Negrel, 1995), which at the same time need urgent global attention. According to WHO fact sheet release in June 2012, 28 million people are visually impaired in the world: 39 million are blind and 246 million have low vision. About 90 percent of the world's visual impaired live in developing countries.

There are five components of Physical Fitness (PF) (Heyward, 2002). This include: cardiopulmonary endurance, muscular fitness, body weight and composition, flexibility and neuromuscular relaxation. There is need to increase awareness of physical activity for optimal health and longevity among learners with visual impairment. Two major evaluation techniques to assess PF include field testing and laboratory method. Measures such as body weight, height, body mass index, waist-to-hip ratio, waist circumference, skin fold measurement are anthropometric in nature.

The basic anthropometry measurements are weight and height. Anthropometric indices are combinations of measurements. They are essential for the interpretation of measurements. It is evident that a value for body weight (BW) alone has no meaning unless it is related to an individual's age or height (WHO, 1995). Weight and height may be combined to produce the body mass index (Wt/ Ht2) or a Pondera index (Wt/ Ht3), or weight may be related to height through the use of reference data. BMI is a good indicator of variability in energy reserves in individuals with sedentary lifestyles.

Lieberman (2002) reiterate that children who are visually impaired consistently exhibit lower levels of fitness than sighted peers. The need for fitness in children who are blind might be greater because of increased energy to complete activity of daily living (Bueli, 1982).

Fogelholm, Malmberg, Suni, Santtila, Kyrolainen and Mantysaari (2005) observed that waist circumference(WC) and body mass index(BMI) are independently associated with variation of cardio respiratory and neuromuscular fitness in young adult men while Lasla (2012) opined that health related anthropometric measure correlate with physical fitness factor, he concluded that the measure can be used to predict function in physical and motor test since his finding reveals a negative significant correlation between health and anthropometric measures.

Colak and colleagues (2004), verify the effect of plying goal ball on some measures of motor fitness. 103 male visual impaired children, age 13-15 years with varying degree of blindness were assessed for motor fitness. All participants underwent motor fitness (balance, handgrip, flexibility, vertical jump, isokinetic concentric peak torque). They found a significant difference between goal ball player and non-goal ball players regarding many motor fitness components. The non-goal ball players were inferior in all motor fitness compared with goal ball players. The study is significant to individual with one disability or the other especially children with special needs.

It is a common thing for newly admitted students of tertiary institutions in Nigeria to undergo health screening as a final prerequisite for admission. During this exercise all vital signs as well as past medical history will be carefully screened through a checklist. Yet, experience has shown that there is no provision for further follow-up to ascertain candidate physical fitness during their studies and after graduation.

In the light of the above, there is need to understand basic anthropometric and physical fitness factors measurement which will help in ascertaining baseline physical activity levels of those with visual impairment in this community before any major critical intervention will be adopted.

Method

The study adopted the correlation and survey research designs with a view to show relationship between **anthropometric parameters** (body weight, body height, body mass index, waist circumference, waist-to-hip ratio) and **physical fitness factors** (Flexibility, Heart rate, Blood pressure, Muscle endurance and Aerobic endurance).

The target group for this study was the male students of University of Jos, who have visually impairme. These were verified through their medical file submitted to the department or in their possession. The population of the study comprised of twenty one students (age range 27-51) with visual impairment in the undergraduate and diploma programs of the University of Jos.

The purposive sampling was used to select the sample for the study. The Anthropometric fitness (ANTHFIT) spread sheet was design by the researcher to collate both anthropometric parameters and physical fitness factors measurement. The study protocol was explained to the participant before given them written consent.

Anthropometric Parameters: Body Height was measured to the nearest 0.5 cm without shoes using a stadiometer for height and mounted scale for weight. Body weight was measured to the nearest 0.5 cm alongside the height after removal of shoes and wearing a light clothing only, using a mechanical beam balance mounted scale on the stadiometer. Body Mass Index (BMI), was calculated by putting the numbers related to height and weight in the equation (wt/ht^2). Waist Circumference, Hip circumference was measured using a measuring tape.

Physical Fitness Factors: Flexibility was measured with the use of sit and reach box or flexibility box of 30.5cm high. Heart rate was measured with the use of Stop Watch. Blood Pressure was measured in a seated position with mercury Sphygmomanometer and stethoscope. Aerobic endurance test was measured with the use of Queens's college step test which has a bench of height 16¼ inch. Muscle endurance was tested using Hand grip dynamometer.

The content validity of the instruments was ascertained by the supervisor as well as experts in test and measurement. The criterion related validity of the mechanical Beam balance to measure weight was sought by comparing the reading with bathroom scale using between 10-15 students and then computed the validity coefficient. Mercury sphygmomanometer was compared with digital apparatus to ensure criterion related validity and validity coefficient computed.

The test –retest reliability was carried out as most of the measurement was taken twice or thrice to establish stability of the instrument. Such include the use of measuring tape for circumferences, stop watch for heart rate; sit-reach box for flexibility and sphygmomanometer for blood pressure.

Data collection took place at the Rehabilitation Laboratory of the Department of Special Education. Each student was given a consent form to ensure their free participation. Their right of confidentiality was ensured. Body Height was measured to the nearest 0.5 cm without shoes using a stadiometer for height and mounted scale for weight. The equipment is from a Chinese company. Each participant stood with heels, buttocks and shoulders resting lightly against the backing board so that the Frankfort plane (a line connecting the superior border of the external auditory meatus with the infraorbital rim) was horizontal (i.e. parallel to the floor).

Body weight was measured to the nearest 0.5 cm alongside the height after removal of shoes and wearing a light clothing only, using a mechanical beam balance mounted scale on the stadiometer. Body Mass Index (BMI), was calculated by putting the numbers related to height and weight in the equation (wt/ht^2).

Waist Circumference was measured using a measuring tape, with measurement made halfway between the lower border of the ribs, and the iliac crest in a horizontal plane. Hip Circumference was measured at the widest point over the buttocks. For each of waist and hip circumference, two measurements to the nearest 0.5 cm was recorded. If the variation

between the measurements was greater than 2 cm, a third measurement was taken. The mean of the two closet measurements was calculated. Waist-to-Hip ratio (WHR) was calculated using the following equation WHR= waist circumference in cm/ hip circumference in cm (Ahmad, 2012).

Flexibility was measured with the use of sit and reach box or flexibility box of 30.5cm high. Have the client sat on the floor with legs together, knee extended, and sole of the feet placed against the edge of the box. The client was instructed to reach forward slowly and as far as possible along the top of the box while keeping the two hands parallel and to hold this position momentarily (-2sec). The researcher ensures that the knees do not flex and that the client avoids leading with one hand. The score in cm is the most distant point on the box contacted by the fingertips (Heyward, 2002).

Heart rate was measured with the use of palpation method on the radial artery which is located on the anterolateral aspect of the wrist directly in line with the base of the thumb. The tip of the middle or index finger was placed on the radial artery, stop watch was used to count for a set of 15 seconds, and the reading was multiply by 4 to obtained value of the beat per minute.

Blood Pressure was measured in a seated position after the participant had rested for at least 5 min. A cuff of suitable size was applied to the participant's exposed upper arm, and was supported by the table at heart level. Blood pressure was measured with a standard Mercury Sphygmomanometer using the first and fifth korotkoff sound was recorded to the nearest 2 mmHg (Dalton et al, 2001).

Aerobic endurance test was measured with the use of Queens's college step test which has a bench of height 16¼ inch. The heart rate was calculated beginning 5 sec after the cessation of exercise; take a 15-sec pulse count. Multiply the 15-sec count by 4 to express the score in beats per minute (bpm). VO_2max in ml.kg^{-1} was estimated using the equation, for men, VO_2max = 111.33-(0.42 X HR) (Heyward, 2002).

Muscle endurance was tested using Hand grip dynamometer. The individual stood erect, with the arm and forearm positioned as follows: shoulder adducted and neutrally rotated, elbow flexed at 90 degree, forearm in the neutral position, and wrist in slight extension (0 to 30 degree). The individual squeezed the dynamometer as hard as possible using one brief contraction and no extraneous body movement. Three trials were done for each hand, allowing a 1-min rest between trials, and the best score as the client's static strength (Heyward, 2002).

Both descriptive and inferential statistics was used to ascertain if any relationship exist between the Anthropometric parameters and physical fitness variables. Data obtained from each respondent was computed into Micro Soft Excel sheet (Version 2010) and then imported into SPSS data editor version 20. The statistical analysis was run to determine descriptive properties of each variable. Pearson Correlation coefficient was obtained for each relationship. Regression analysis was done which produced the regression equation that links variables and allow a specific prediction to be made .Observed difference was tested for any significance. The values of R, R^2, F, constant and slope was displayed on the table. Appropriate decision made, using α value of 0.05. Null hypothesis was rejected if t calculated > t critical (p=0.05), thereby upholding the alternative hypothesis. On the other hand, if t calculated < t critical (p=0.05), researcher fails to reject or retain the Ho.

Authors declare that there is no conflict of interest. Inform consent obtained for this study from departmental ethic committee for post graduate studies of University of Jos.

Result

TABLE 1: Descriptive Statistics for the Antropometric Parameters and Age

	X±SD	Min	Max	Skweness	Kurtosis
Age (yr)	35±7.12	24	51	0.43	-0.69
Body weight(kg)	67±15.32	42	94	0.33	-0.86
Body height (m)	1.68±0.07	1.54	1.85	-0.09	-0.16

BMI (kgm−²)m)	23.45±3.99	16.0	31.1	-0.02	-0.69
Waist circum(cm)	79.62±10.79	60	102	0.29	-0.47
Hip Circum(cm)	87.19±13.34	59	109	-0.58	-0.15
WHR	0.9±0.18	0.71	1.47	2.51	5.99

As shown in the table above, a total of 21 participants with visual impairment were used for the study, with their respective mean and standard deviation of their age and selected anthropometric parameters.

TABLE 2: Descriptive Statistics for the Physical Fitness Factors

	$X \pm SD$	Min	Max	Skweness	Kurtosis
Heart Rbeat/m	66.81 ± 13.83	49	96	0.59	-0.58
BP Systolic(mmHg)	130.10 ± 19.96	102	181	1.14	1.31
BP Diastolic(mmg)	86.19 ± 12.94	64	120	1.02	1.48
Grip RT	45.33 ± 17.82	18	77	-0.15	-0.89
Grip Lt	51.10 ± 16.06	18	73	-0.45	-0.76
Flexibility(cm)	22.21 ± 8.93	3.00	33.50	-0.88	-0.10
Aerobic Endu	71.24 ± 6.72	56	83	-0.29	-0.12

Table 3: Descriptive statistics showing the Impairment type

	Frequency	Percent	Valid Percent	Cumulative Percent
BLIND	13	61.9	61.9	61.9
Low Vision	8	38.1	38.1	100.0
Valid Total	21	100	100	

As shown in the table above, learners (N=21) with visual impairment that participated in the study are categorized into two- the blind and those with low vision; blind 13(61.9%), low vision 8(38.1%).

Table 4: Linear Correlation Matrix between Anthropometric predictors and Physical Fitness Factors.

Predictor/independent Antropometric parameters (X)	Heart Rate beat/min	BP Systolic mmHg	BP Diastolic mmHg	Grip Rt	Grip Lt	Flexibility	Aerobic Endurance mlkg.min^{-1}
Body weight	.084	.443*	.379	.140	.134	.082	-.124
Body height	.324	.313	.301	.072	-.090	.044	-.349
BMI	-.0.062	.398	.338	.163	.232	.044	.027
WC	.190	.229	.257	.119	.097	.277	.014
HC	.010	.235	.147	.447*	.412	.043	-.058
WHR	.136	-.004	.121	-.378	-.361	.160	-.058

Correlation is significant at the 0.05 level (2-tailed).

Correlation is significant at the 0.01 level (2-tailed).

The table above shows the Pearson moment correlation coefficient of the linear relationship between the anthropometric parameters and physical fitness factors. The data showed no violation of normality, linearity or homoscedasticity.

Research Question 1

Is there any relationship between Body weight (BW) and Physical fitness of learners with visual impairment?

From the correlation matrix shown above in table 4, we identify the kind of association between Body weight as a predictor/independent parameter and various physical fitness factors such as Heart rate, systolic, diastolic, Rt grip strength, Lt grip strength, flexibility and Aerobic endurance- p=0.05 r = .084, .443*, .379, .140, .134, .082 and -.0124 respectively. The scatter plot also buttresses how the points vary toward the imaginary line. There are

positive and negative relationships as reflected in the table though it might be extremely weak or mild.

Research Question 2

Is there any relationship between body height (BH) and Physical fitness of learners with visual impairments?

From the same correlation table, the relationship between body height as an independent parameter to the physical fitness factors such as Heart rate, systolic, diastolic, Rt grip strength, Lt grip strength, flexibility and Aerobic endurance is established. The values are: p=0.05,r =.324,.313,.301, .072, -.090, .044 and -.349 respectively. The scatter plot of BH versus Aerobic endurance is shown in fig. 2. We have values both at either direction as well, as body height increases the grip Lt and aerobic endurance decreases while other Physical factors increases

Research Question 3

Is there any association between the Body Mass Index (BMI) and Physical fitness of learners with visual impairment?

Correlation table display the association between index of weight and height which is BMI (23.45±3.99)to Heart rate, systolic, diastolic, Rt grip strength, Lt grip strength, flexibility and Aerobic endurance with both positive and negative values as p=0.05, r = -.062, .398, .338, .163, .232, .044, .027 respectively.

Research Question 4

Is there any relationship between Waist circumference (WC) and Physical fitness of learners with visual impairment?

The mean Waist circumference of the respondents is 79.6 cm and S.D of 10.79. Table of correlation gives the values of correlation coefficient between WC and Physical fitness factors (HR, BP Systolic, BP diastolic, grip Rt , grip Lt, flexibility and Aerobic endurance), at p=0.05 r= .190, .229, .257, .119, .097, .277 and .014 respectively. WC has a positive direction and correlation with all physical fitness factors.

Research Question 5

Is there any relationship between waist-to hip ratio (WHR) and Physical fitness factors?

From table of correlation matrix, WHR moves in a positive direction as the values of HR, BP diastolic, flexibility moves in a positive direction. On the other hand, WHR relationship has an inverse relationship with BP systolic, grip Rt and grip Lt.

It is essential to add that Hip circumference, which is an index used in calculating WHR has a positive correlation with all physical fitness factors except with Aerobic endurance of which the relationship is in a negative direction.

Hypothesis 1

There is no significant difference between the body weight and Physical fitness factors of learners with visual impairment. Ho: $u_1 = u_2$

From table 4, computation of body weight versus respective physical fitness was correlated to see if any significant relationship exist. The rule is, if the calculated value displayed on the table is ≤ 0.05, then there is statistical significant correlation between the two variables compared, this will make us to accept null hypothesis. On the other hand, if the calculated table value is > 0.05 then there is no statistical significant correlation between the two variables, therefore enable us to reject the null hypothesis and upheld the alternative hypothesis .

For Body weight versus Heart rate, BP Systolic, BP diastolic, grip Rt, grip Lt and flexibility, the calculated values, at 2-tailed are 0.716, 0.090,0.544, 0.563,0.725 and 0.124 respectively) for each relationship are found to be greater than > 0.05. In the light of this,

there is no statistical significant correlation between weight and Heart rate, weight and BP diastolic, weight and grip Rt, weight and grip left, weight and flexibility. This will make us to reject the null hypothesis that says, there is no significant difference between body weight and Heart rate, BP Systolic, BP diastolic, grip Rt, grip Lt and flexibility. We hereby upheld alternative hypothesis that says "there is a significant correlation between body weight and Heart rate, BP Systolic, BP diastolic, grip Rt, grip Lt and flexibility". This means that the computed test is in the rejection region.

From the same table 5, between body weight and BP systolic, the Calculated value 0.044<0.05; there is statistical significant correlation between body weight and BP systolic. We here by failed to reject, that is accept/retain null hypothesis- "there is no significant correlation between BW and BP systolic. This means that the computed test is in acceptance region.

Hypothesis 2

There is no significant difference between the body height and Physical fitness of learners with visual impairment? Ho: $u_1 = u_2$

From table 4, we can see that all calculated values of physical fitness factors using 2 tailed are found to be >0.05. In the light of this when there is no statistical significant correlation to upheld the null hypothesis on the relationship between body height and physical fitness variables, we conclude that the null hypothesis be rejected and retain the alternative hypothesis.

Hypothesis 3

There is no significant difference between the body mass index (BMI) and Physical fitness factors of learners with visual impairment. Ho: $u_1 = u_2$

The 2 tailed values obtained from table 4 reveals that all calculated values are greater than 0.05. As a result no statistically significant correlation between BMI and all physical fitness factors in this study, this enable the researcher to reject the null hypothesis and accept the alternative hypothesis. Since the relationship is not significant, any increase in BMI may not necessary means we must have same corresponding increase in physical fitness factors, Although any shift obtained will be in a positive direction positive.

Table 5 Model Summary for Regression

Predicting Heart Rate from various Anthropometric parameters

	constant a	b_1	R^2	sig.	df_1	df_2	linear regression equation
BW	61.684	0.076	.007	.716	1	19	HR = 61.684 + 0.076 **BW**
BH	-31.373	58.178	.104	.152	1	19	HR = -31.373 + 58.178 **BH**
BMI	71.818	-.0214	.004	.790	1	19	HR =71.818 – 0.214 **BMI**
WC	47.460	.243	.036	.410	1	19	HR = 47.460 + .234 **WC**
HC	65.861	.011	.000	.964	1	19	HR = 65.861 + .964 **HC**
WHR	57.545	10.003	.018	.556	1	19	HR = 57.545 + 10.003 **WHR**

Table 5 comes by running a linear regression analysis which will predict physical fitness factor, (in this case heart rate) from various anthropometric parameters. The anthropometric parameters are the predictor (independent variable), while the heart rate is the dependent (criterion variable) that is being predicted. The constant a and b_1 (slope of the straight line graph) value are inserted into the linear equation y = a + bx, where x is the anthropometric variable to predict y. Equation connecting each anthropometric parameters are displayed on the table above.

For instance, to know what the heart rate will be when body weight is 50. Using the relation HR = 61.684 + 0.076 BW; HR = 61.684 + 0.076 x 50; this gives 65.484 as the heart rate. Going back to the linear regression fit, when HR was plotted against the BW, we can see that the prediction equation really marks the point (y-axis) on the straight line, giving us the

value of 65.5. This can be seen for other equation produced from respective anthropometric variables to obtain HR.

To obtain equation that will connect all anthropometric variables in order to predict what Heart rate will be, a multiple linear regression was run and values of constant a, and b (slope) was produced for each predictor. The equation is HR = -84.27 + .12 BW + .224 BH -.718 BMI + .467 WC + 1.158 HC + 1.135 WHR. Equation for other Physical fitness factors and independent predictors are shown in the table below:

Table 6 Multiple linear regression equation

	Predictors/independent						
Criterion/ Dependent	a	BW b_1	BH b_2	BMI b_3	WC b_4	HC b_5	WHR b_6
HR	-84.276	.12	.224	-.718	-.467	1.158	1.135
BP-Sys	1049.874	6.030	-1.8	-3.45	-.158	-1.269	-0.708
BP-Dia	213.433	3.886	-1.446	-3.115	-2.971	3.963	3.878
Grip Rt	-783.007	-5.969	1.860	3.968	0.563	0.814	-.160
Grip Lt	-209.056	-3.393	0.661	2.421	1.076	-.125	-.957

The researcher arrived at the following equations connecting various criterion variables (physical fitness factor) and all predictors (anthropometric parameters):

HR = -84.27 + .12 **BW** + .224 **BH** -.718 **BMI** + .467 **WC** + 1.158 **HC** + 1.135 **WHR**.

BP Systolic = 1049.874 + 6.030 **BW** – 1.8 **BH** – 3.45 **BMI** – 0.158 **WC** – 1.269 **HC** – 0.708 **WHR**

Discussion of Results

The discussion of the results in this section is carried out in line with the research variables, questions and hypothesis of this study. In assessing physical fitness, five components have been advocated by investigator to be essential (Heyward, 2000).

BMI is used as a crude index of obesity. Data from a report on obesity (WHO, 1998) explained a classification standard of overweight and obesity based on body mass index. Using this classification for the present study 4.76% of the learners with Visual impairment are underweight (BMI<18.5), 61.9% have normal weight (BMI 18.5-24.9), this constitute majority of the learners, 28.57% are overweight (BMI 25.0-29.9), the rest 4.76% (BMI 30.0-34.9) have class 1 obesity. None of the students has class 2 (BMI 35.0-39.9) or class 3 (BMI≥ 40.0. Scientist agreed on the use of BMI in health risk appraisal assumes that people who are disproportionately heavy are so because of excess fatness. The mean BMI of the learner 23.5±3.99 falls within the normal value. There is a prediction error of ≥5.0 % which make some scientist to shine away from using BMI in estimation of obesity.

From table 4, we can see that BMI is related to physical fitness factors. It has an inverse relationship with HR and a positive relationship with both systolic and diastolic blood pressure, grip strength Lt and Rt and flexibility. The result is consistent with the findings of Fogelholm, Malmbers, Suni, Santilla, Kyrolaine and Mantyseari (2006).

In health related anthropometric measures in connection with physical fitness factor (Jaafari, 2012), he obtained a negative significant correlation between BMI and aerobic fitness. This does not agree with the present study where a positive non-significant relationship is obtained at both 0.01 and 0.05 level. Jafaari got the association at p=0.001. His finding on if any relationship exist between BMI and flexibility is consistent with the present study (r=0.044), though the value shows a weak relationship. The mean Value of BMI obtained 23.45±3.99 when compared with other studies, was found to be lower than Fogelholm et al (2006) finding 25.3±3.8, and higher than Adeyanju (2008) 22.6±1.88

The Waist circumference and WHR can help us to distinguish between pattern of fat distribution in the upper and lower body. The measures are strongly associated with visceral fat and appear to be acceptable indexes of intra-abdominal fat (Depres et al. 1991). The

national cholesterol Education Program (NCEP, 2001) recommends using waist circumference (>100cm) for men and > 88cm for women to evaluate obesity as a risk factor for coronary heart disease and metabolic diseases. In this study, the mean WC of learners with visual impairment is 79.62, this shows that majority are not at risk of developing such diseases. Yet, only 4.8% might suffer such in the future.

The result obtained in the relationship between WC and aerobic fitness was positive and non-significant at alpha level of .05 respectively, this was inconsistent with Jafaari study where he obtained a negative and significant response at alpha level of 0.004. The result obtained when WC is correlated with flexibility is highly consistent with Jafaari (r=0.044). These point to the fact that when the waist is free of excess fat, activity of daily living will be much easier to perform. Common condition like arthritis, lumbago and radiculopathy will not be heard of.

In WHR, learners with visual impairment has an average value of 0.92, this is within the standard value in young adults (0.94 for men and 0.82 for women). Any value above those quoted is at risk for adverse health consequences (Bray & Gray, 1988). In this study, only 9.5% (N=2) of the learners might be affected if the WHR norm standardization reference Manual is used. On the relationship between WHR and physical fitness factor, the result of the study is consistent with Mohsei et al (2012) which shows that flexibility test do not demonstrate a significant correlation with WHR.

The maximum oxygen uptake (VO_2max) is the most valid measure of functional capacity of the cardiorespiratory system; this is reflected in the capacity of the heart, lung and blood to transport oxygen to the working muscles and its utilization by the muscles during exercise. From the findings, the learners having a mean value of 71.24 $ml.kg^{-1}.min^{-1}$ (norm 49+). This is reflected in the fact that most learners with visual impairment in this institution are not living a sedentary life. They are active participant in attending lectures and carrying out their daily activities.

When an individual is tested on two occasions and found to have a Systolic BP ≥140 and a Diastolic BP ≥90, such individual is hypertensive (National Committee on High BP, 1997). On the average, in the present study with the mean reading of BP 130/86, it is assumed that the group is not hypertensive. On the other hand, taking a critical look, we found about 30% of the population is hypertensive with 1% at the stage III hypertension class. Hypertension has being found to be a risk factor for stroke and some debilitating eye conditions that could result in total blindness.

On the issue of grip strength, using the static strength norm, the population in this study has an average grip on the left hand , mean of 51 (norm: 43-55) while below average on the right hand, mean of 45 (norm: 41-47). Having low grip strength has a major health implication when carrying out daily living activity especially for right handed individuals.

Summary of Finding

1. Body weight is related to heart rate, diastolic blood pressure, Rt and Lt grip strength, flexibility and aerobic endurance.

On the other hand, there is no relationship between systolic blood pressure and body weight.

2. Body height is related to all physical fitness factors measured in this study
3. Body mass index is associated to heart rate, systolic and diastolic blood pressure, left and right grip strength, flexibility and aerobic endurance.
4. Waist circumference is related to all physical fitness factors measured in this study.
5. Hip circumference has a cordial relationship with HR, BP systolic and diastolic, left grip strength, flexibility and aerobic endurance but no association is found between hip circumference and right grip strength.
6. Waist- to hip- ratio is related to all physical fitness factor dealt with in this study.

7. All relationship obtained are non-causal in nature. This means the association between the variables was not solely brought about by each of the variable, but factors not consider might be responsible for such relationship.
8. The relationship obtained between anthropometric parameters and physical fitness factors are extremely weak.
9. The result of waist circumference reveals that ample size among the group might probably (have the likelihood) develop hypertension coronary heart disease and metabolic disease in the near future.
10. The low grip strength among learners with visual impairment in this study on the right hand raises a point of concern.
11. From this study, various equations that connect individual anthropometric parameter and physical fitness factor(s) are predicted through both simple linear and multiple linear regression analysis.
12. Relationships obtained are of linear origin.

Conclusion

1. There is a linear relationship between anthropometric parameters and physical fitness factors.
2. It is possible to predict what each physical fitness factor(s) will be from anthropometric parameters.
3. The anthropometric equations obtained must be interpreted with care. It must not be generalized for all population outside this study. The population-specific anthropometric equations are valid for, and can be applied only to, individuals whose physical characteristics (age, gender, and level of body fatness) are similar to those in specific population sub group.
4. Anthropometric measurement to depict physical fitness is non-invasive, not expensive techniques. This should be made available for learners with and without visual impairment in this institution to alert those at danger list for major health problem.

Recommendation

1. Physical fitness program course should be incorporated into educational curriculum of all students including those with visual impairment in this university.
2. Health related Physical fitness level of learners should be given priority, the Rehabilitation Laboratory of the Special Education Department should be well equipped to enable student to have access to the equipment's.
3. Physical activity level of visual learners can be improved by introducing adaptive exercise strategies.

Limitation of the Study

1. The study is limited to the linear relationship between anthropometric parameters and physical fitness factors of male learner with visual impairment at the University of Jos.
2. The sample size (N=21) was less and this may affect generalization.

Suggestions for further Study

1. Studies should be carried out to ascertain nonlinear relationship between anthropometric parameters and physical fitness factors.
2. Studies should be carried out using female learners with visual impairment.
3. Studies should be done to ascertain differences in relationship between anthropometric parameters in learners with and without visual impairment involve in sport activities.

4. Subsequent studies may include measurement of body composition using skin fold techniques (Caliper) to ascertain the percentage level of fat.
5. Interested researcher must increase the sample size to ascertain relationship between the variables of anthropometric and physical fitness.
6. Further studies should consider true experimentation and probability sampling techniques.

Contribution to Knowledge

This study has contributed to the knowledge base of general and special teachers on learners with visual impairment especially on their health related physical fitness. They have also seen how noninvasive anthropometric indices can be used to predict physical fitness.

Secondly, the curriculum planner has seen the need to incorporate physical fitness program when writing syllabus or curriculum for the learners with visual impairment.

Health professional role has been expanded in that routine counseling must be given to learners with visual impairment on the maintenance of regular physical activity.

The study has opened a new trend in research for special educators on physical activity measurement for learners with visual impairment.

Finally, Family has greatly benefited as adaptation in both physical and social engagement will be in place for their family members who are visually impaired.

References

[1] Adeyanju, E.S.(2008). Morphological and Physiological Characteristics of FCE Kano female soccer players to the 2007 MCEGA Games. *Journal of Education, 1*(1), 225-231

[2] Ahmad, A., Mohsen, A.B., Mohammad, D., Alimardani, M.(2012).Relationship between physical fitness and anthropometric indicators in non-athlete students. *Annuals of Biological Research, 3(9)*, 4617-4621. www.scholarresearchlibrary.com

[3] American College of Sport Medicine (ACSM). (2000). *ACSM's guidelines for exercise testing and prescription.* Philadelphia: Lippincott Williams & Wilkins.

[4] Awotunde, P.O. & Ugodulunwa, C.A. (2004). *Research methods in education.* (Rev. ed.) Jos Fab Anieh Nigeria Ltd.

[5] Blessing, D.L., & McCrimmon, D. (1993). The effect of regular exercise program for visually impaired adsighted school children. *Journal of visual impairment & Blindness, 87,* 50-52.

[6] Bray, G.A. & Gray, D.S.(1988). Obesity: Part 1-Pathogenesis. *Western Journal of Medicine 149*: 429-441.

[7] Bueli, C.E. (1982). Physical education and recreation for the visually Handicapped. Reston, VA: *American Alliance for Health, Physical Education, Recreation and dance.*

[8] Colak, T., Bamac, B., Aydin, M., Mreic, B., & Ozbek, A.(2004).Physical fitness levels of blind and visually impaired goalball team players. *Isokinetics and exercise science, 12,*247-252.

[9] Copper Institute for Aerobics Research. (1997). *The Physical Fitness specialist certification manual.* Dallax Texas: USA.

[10] Crespo, C.J., Ainsworth, B.E., Keteyian, S.J., Health, G.W., & Smith, E. (1999). Prevalence of physical inactivity and its relation to social class in U.S adults. Results from the third National Health and Nutrition Examination survey, 1888-1994. *Medicine & Science 31*: 1821-1827.

[11] Dalton, M., Cameron, A.J., Zimmet, P.Z., Shaw, J.E., Jolley, D., Dunstan, D.W., & Welborn, T.A. (2003).Waist circumference, waist-hip ratio and body mass index and their correlation with cardiovascular disease risk factors in Australian adults. *Journal of internal medicine, 254,*555-563.

[12] Depres, J.P., Prud'homme, D., Pouliot, M. C., Tremblay, A., & Bouchard, C. (1991). Estimation of deep adipose- tissue accumulation from simple anthropometric measurements in men. *American Journal of Clinical Nutrition,* 54: 471-477.

[13] Fogelholm, M., Malmberg, J., Suni, J., Santtila, M., Kyrolainen, H., & Mantysaari, M.(2006).Waist circumference and BMI are independently associated with the variation of cardio-respiratory and neuromuscular fitness in young adult men. *International Journal of Obesity, 30,*962-969.

[14] Heyward, V.H. (2002). *Advanced Fitness Assessment and Exercise Prescription.* 4th Ed. Burgess Publishing company.IL: USA.

[15] Hopkin, W.G., Gaeta, H., Thomas, A.C., & Hill, P.McN.(1987).Physical fitness of blind and sighted children. *Eur J Appl Physiol, 56*,69-73.

[16] Jaafari, L.(20012).Health-related anthropometric measures in connection with physical fitness factors. *IPEDR, 31*,21-24.

[17] Thylefor B, Negrwel AD, Pararajasegaram R, (1995). *Global Date in Blindness Bull WHO 1995; 73:* 115 – 21

[18] Lieberman, L.J.(2002).Fitness for individual who are visually impaired or deaf blind. *Helen Reid educational foundation 34 (1)*,13-8023.

[19] Lieberman, L.J., & McHugh, E.(2001). Health-related fitness of children who are visually impaired. *Journal of visual impairment, 5*,272-287.

[20] National Committee on High Blood Pressure.(1997). *Data from the 6th report on detection, evaluation and treatment of high blood pressure.* NIH Publication No. 98-4080.

[21] New king James Bible.(2000). For bodily exercise profited little. *1 Timothy Chapter 4 verse 8*.

[22] National Cholesterol Education Program. NCEP. (2001). Executive summary of the third report of the National Cholesterol Education Program expert panel on detection, evaluation and treatment of high blood cholesterol in adults. *Journal of the American Medical Association, 285*: 2486-2497.

[23] Pratt, M., Macera, C., & Blanton, C. (1999). Levels of physical activity and inactivity in children and adullts in the United States: Current evidence and research issues. *Medicine & Science in Sports & Exercise 31* (Suppl.): S526-S533.

[24] U.S Department of Health and Human Services. (1996).Physical activity and health: A report of the Surgeon General. Atlanta,GA: *U.S Center for Disease Control, Prevention and Health Promotion.*

[25] Wang, Z.M, Pierson R.N., Heymsfield, S.B.(1992). The five-level model: a new approach to organizing body-composition research. *American Journal of Clinical Nutrition.* 56: 19-28

[26] WHO Working Group. (1986). Use and interpretation of anthropometric indicators of nutritional status. *Bulletin of the World Health Organization.* 64: 929-941. ries 854

[27] WHO (1995). Report of WHO Expert Committee. WHO Technical Report Series 854.

[28] WHO Report.(1998). Obesity: Preventing and managing the global epidemic. *Report of a WHO consultant on Obesity.* Geneva: World Health Organization.

[29] Zenic, N., Foretic, N., & Blazevic, M.(2013).Nonlinear relationship between anthropometric and physical fitness variables in untrained pubescent boys. *Coll Antropol, 37(2)*,153-159.

Managing the Paradigm Shift to E-Learning in Distance Education (A Case Study at CoDE, UCC)

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Abstract

This study sought to find out how e-learning staff in the College of Distance Education of University of Cape Coast (CoDE, UCC) are prepared and vested in the management of paradigm shift to e-learning. Diagrams of Educational Management Paradigm of the past and that of today were looked at. There have been a number of earlier comparative studies e.g. Peter's(2003) which indicate that paradigm shift includes a transition from modern curricula to post-modern curricula. The population for the study consisted of all 15 staff of CoDE in UCC who are managing the e-learning platform. All the 15 staff were used as the sample for the study. The instrument used for data collection was an interview guide. Data were analysed using themes. All the respondents agreed that e-learning platform is a forum for knowledge sharing and it is also a space for collaboration and interactivity. They also agreed that the Goal of e-learning is to create a transformative learning environment. They also stated that they have the skills in implementing e-learning at CoDE in UCC. However, their main challenges were that students are not given the chance to control e-learning platform. It is recommended that staff should be very clear about their multiple roles they are prepared for and take on while implementing e-learning. The staff should also have the corresponding changing role-related skills and competencies in order to provide high quality platform for distance learners.

Key words: CoDE, UCC, paradigm shift, e-learning, transition modern curricula, post-modern curricula, e-learning platform, role-related skills.

Introduction

The way in which learning is experienced has begun to change. Technology is impacting education to such an extent that educators and industry-professionals are claiming a revolution is underway. Students are no longer restricted to hierarchical, top-down, traditional learning environments. Increasingly, students are offered an individualized and adaptive form of education that can be accessed anywhere and at any time. This change in the learning experience could not have come at a better time.

The new generation of students are increasingly 'digital natives' (Prensky, 2001), who view technology as a non-remarkable feature of daily-life. The impact of technology in education is no longer new and exciting; it has become merely a necessity. In the last decade, distance education has developed in two major directions: the individual flexible teaching model and the extended classroom model (Rekkedal & Dye, 2007). The former allows students to start the class at any time, study in isolation and communicate with instructors and classmates through asynchronous tools. The latter organizes students into groups, requires them to meet at local study centre, and allow them to use interactive technologies such as video conferencing to interact (Rekkedal & Dye, 2007).

Due to the rapid development of technology, courses using a variety of media are being delivered to students in various locations in an effort to serve the educational needs of growing populations. In many cases, developments in technology allow distance education programs to provide specialized courses to students in geographically remote areas with increasing interactivity between students (Fahad, 2009).

The College of Distance Education (CoDE) of the University of Cape Coast (UCC) has therefore become a stepping stone by providing Huawaii Tablets to their students as a way of

integrating E-learning in their curriculum. Students in online courses expect guidance in four domains: the technical-operational domain, task-oriented domain, personal-emotional domain, and the social domain. Moreover, it was found that within distant learning course where face-to-face meetings are absent, the need for guidance with "personal emotional significance" is amplified. Therefore, the study seeks to find out how E-learning staff in CoDE UCC are prepared and vested in the management of paradigm shift to E-learning. The research seeks to determine:

1. Staff perception towards adopting an e-learning platform.
2. Staff skills in using e-learning platform.
3. Challenges staffs are likely to face when using e-learning system.

Review of Related Literature

The term paradigm shift is being used often in the 21st century. The paradigm shift in distance education refers to the transition process. New concepts, models and terms are different from the old ones. Paradigm shift in distance education means substitution of the new educational terms with the old ones. This paradigm shift includes a transition from modern curricula to post-modern curricula and also includes a transition from traditional learning to digitized formats of learning (Peters, 2003). This paradigm shift is about a shift from tutor centered teaching to a learner centered learning.

The educational management paradigms of past and today primarily have focused upon the interaction between instructors, learners and subject matters. Naturally, the structure and the developments in the surrounding society play an important role as far as models transition from one model to another are concerned. The models may be looked upon as changes of paradigms assuming new forms in connection with the implementation of new discoveries or theories and changes in views and attitudes (Sigri & Nielsson, 2003).

The educational management paradigm of the past describes the interaction among instructors, learners and education/training contents viewed from educational/teaching traditions of the past (Figure-1). To a very great extent, this situation was characterized by a verbal flow, streaming from the instructor directly to the learner. The instructor possessed all existing knowledge and experience, and he/she alone decided in which way knowledge should be transmitted. In fact, the concept unfortunately may lack internal coherence and connection to anything the learner already knows (Amig, 2001).

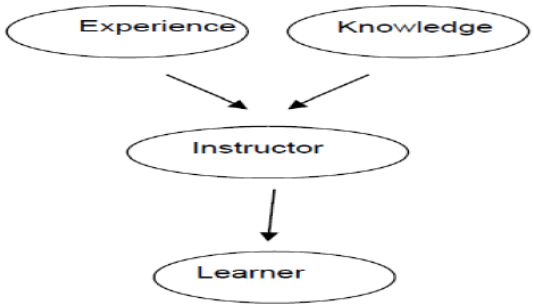

Figure 1: The Educational Management Paradigm of the Past

Source: Sigri, U., & Nielsson, L. (2003).

The educational paradigm of today shown in Figure 2 is an expression of how interaction between instructor, learners and contents are experienced. Still the instructor plays a central role and the main part of the communication is based upon the instructor's knowledge and experience. The communication is two-ways and it takes place both between the instructor and the learner as well. The responsibility is a bit more differentiated from the past paradigm. Both instructor and learners are responsible in the teaching process (Husmann & Miller, 2001).

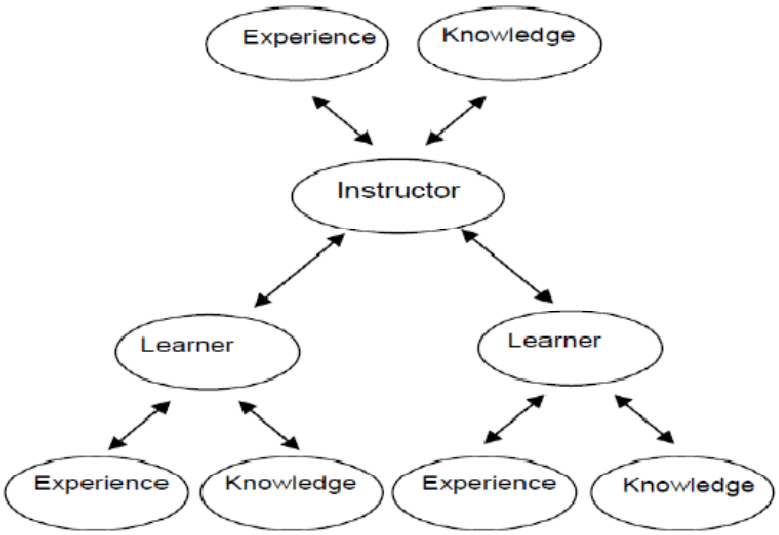

Figure 2: The Educational Management Paradigm of Today

Source: Sigri, U., & Nielsson, L. (2003).

The educational paradigm of tomorrow shown at Figure-3 may already be experienced as a fact in great parts of the highly civilized world. One might call it "e-learning based" paradigm with the "management knowledge base" (learning resource centre) element in which the phrase "e-learning" has to be perceived as "information technology" (Sigri & Nielsson, 2003). Here we experience an essential difference from the two other paradigms.

The knowledge base (learning resource centre) is placed in the centre, and the instructor's role as well as the learners' roles is equally important for the learning process. The communication is two-ways between instructor and learning resource centre, instructor and learners and among learners themselves. In comparison with the two other paradigms the general idea now is to place the responsibility upon the shoulders of the learners (Crumpacker, 2001).

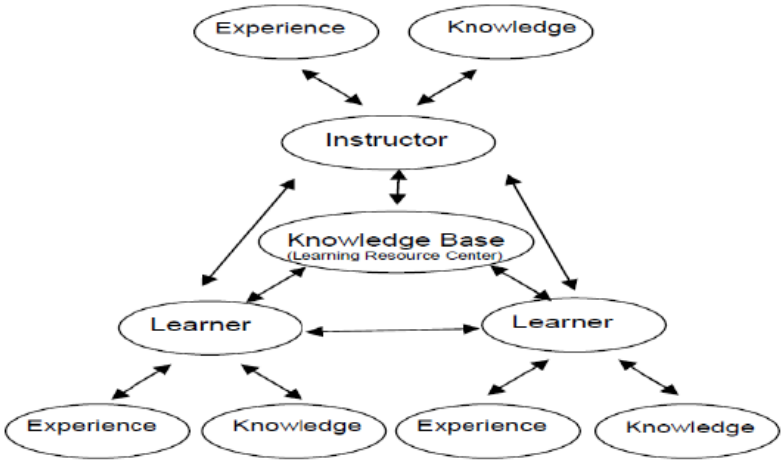

Figure 3: The Educational Management Paradigm of Future

Source: Sigri, U., & Nielsson, L. (2003).

The new educational management paradigm stresses the importance of "learning resource centre" (LRC) which is a place where learners may go to locate instructional materials and use equipment to solve a problem or fulfill a learning objective. Furthermore, a specific

clarification with regard to technological capacities and limitations is required, in order that teaching processes are accomplished in appropriate way. The new educational management paradigm with learning resource centre expresses a “searching-responsibility” of the learners unlike the “receiving-responsibility” of the earlier paradigms. In a pedagogic sense of the words one must distinguish between actually attending a series of lectures with only limited or no dialogue and the kind of teaching in which learners actively participate in the learning process, including problem identification, discussions, identification of key issues, individual learners research in connection with the gathering of information of specific issues (Sigri & Nielsson, 2003).

Technological Components of Distance Education

Components of distance education are changing. Distance learning environments are becoming highly interactive and are being supported by hybrid networks and virtual classrooms (Williams, Paprock & Covington, 1999). Audio, video, digital multi-media (including audio, video and incorporating text), texts (including still graphics) and direct (face to face) human contact are the most important media that are used in distance education (Bates, 2005).

Punnie and Cabrera (2006) specified some technological trends that will shape the future of knowledge society and they are:

1. Broadband Internet access which is becoming more widespread, especially in well-advanced economies, driven by peer-to-peer file sharing and features.
2. Weblogs or blogs which are becoming a major source of information and communication for internet users.
3. Podcasting could be a driver for mobile learning.
4. Short Message Services (SMS) and the Multimedia Messaging Services (MMS) which are also becoming important providers of new content and offer ways for people to be mobile and share information.
5. Open source software and open source content which are challenging existing software and content developers, including educational institutions are integrating them into their curriculum.

Social software and Web 2.0 are also the new technological components of distance education. This new concepts are shaping the educational goals in e-learning. Anytime, anywhere flexible and high-quality learning environments containing well organized support services are the main expectation of students in the information age (Khan, 2007). Therefore, social software can be used in education in the process of changing goals and expectations. For this reason some key characteristics of social software that must be analysed for distance education are indicated below by Owen, Grant, Sayers and Facer, (2006):

1. Social software delivers communication between groups.
2. Social software has new tools for creation of knowledge.
3. Social software enables communication between many students.
4. Social software provides sharing resources.
5. Social software assists personalization of priorities.
6. Social software delivers collaborative indexing and collecting information.

Rapid developments in social software technologies such as wikis have enormous reflections in educational organizations. Developing, editing, reorganizing facilities of web based content provide students to share knowledge with their friends and their teachers. Therefore social software have role to develop collaboration between students (Choy & Ng, 2007). Weblogs, Flickr, deli.cio.us as photo or bookmarking systems, MySpace, YouTube and Facebook as an example of sites are the popular trends to develop and share information with society. These collaborative tools have emphasized the importance of social software for all organizations (Minocha, Schenks, Sclater, Thomas & Hause, 2007).

Basic principles of Web 2.0 and Social software can be summarized by three dimensions according to Huertas, Casado, Corcoles, Mor and Roldan (2007):

1. Student- center design: Students can develop their own knowledge.
2. Teachers and students as peers in a social network.
3. A transition process.

Methodology

Descriptive research was deemed appropriate for the study because it involved collection of data in order to answer questions concerning the subject matter under study. The respondents selected for the study was sampled using census sampling technique and consisted of all 15 staff of Code Master of Education (Information Technology) Department in UCC who are managing the e-learning platform. The instrument for data collection was an interview guide. An interview is a managed verbal exchange (Ritchie & Lewis, 2003). Data were anaysed using themes.

Results and Discussion

Quotations and quotes were used to confirm statements to give statistical reflections on key issues in terms of the research questions. The demographic characteristics considered in the study are sex, age, marital and educational level. The demographic characteristics of the respondents helped in determining the extent to which the responses they provided could be depended upon. Fifteen respondents were interviewed.

The demographic characteristics of the staff revealed that there were (70%) of male to (30%) female, indicative of gender bias. This shows that males dominated females in the study.

Five (22.7%) of the respondents felt between 20 – 25 age bracket, 4 (20.3%) of them fell in the 26 – 30 age bracket and 2 (18.3%) of them fell in 31 – 35 age bracket. The remaining 4 (20.3%) fell in the 36 – 40 age bracket. The age distribution of the respondents shows that they were mature enough. One may therefore conclude that they would be able to express their opinion and views as to what e-learning entails.

On the educational background of the respondents, it was seen from the data gathered from the interviews that second degree holders constitute the bulk of interviewees having their masters in Information Technology and Computer Science. The duties of staff in e-learning require people with great knowledge and expertise in computing.

Perception of staff towards adopting of an e-learning platform

In trying to answer the research question, staff were asked what they see e-learning platform. Almost all of them answered *that e-learning forum is for knowledge sharing, the content in the existing e-learning system can only be modified by staff, e-learning space is for collaboration and interactivity, the current e-learning system did not allow students to control their learning environment and e-learning limits peer to peer interactivity*. Based on the findings, most of the staff has a moderate positive perception towards e-learning. From the findings, e-learning forum captured most of the staff attention due to its interactivity functions in e-learning system. Most of them believe that e-learning forum is an open space for instructional discussion. The findings of the study also support the work of Tasir, Al-Dheleai and Shukor (2014) on perception of staff towards e-learning platform in Malaysia.

Additionally, report by Gilcher & Johnstone (2009) also provides evidence that staff attitudes improve as experience with distance education increases, and as instructors become more familiar with the technology and logistics of distance teaching, and then they have positive perception on e-learning platform.

Staff skills in using e-learning platform

The goal of e-learning is to create a transformative learning environment. This means using innovative techniques and a variety of resources in the learning process. A transformative approach to online learning may result in increased reflection due to writing and peer interaction and improved problem solving and critical thinking due to peer modeling and

mentoring (Mayes, 2011). Respondents were asked if they have the needed skills in e-learning to achieve this.

The interviewees further stated their skills in implementing e-learning. Some qualitative comments noted from staff interviewed were; *Experience of using online discussion tools, experience of internet navigation, downloading and uploading files through internet, using weblogs or blogs interface and using podcasting.*

Challenges staffs are likely to face when using e-learning system

A challenge is anything that retards the progress of any set objective. Students faced problems in the e-learning system because information is seldom updated by lecturers. They can control their e-learning environment well if developers and staff update their e-learning platform.

The respondent interviewed indicated that students will not be given the chance to control the e-learning platform. Therefore, further action should be taken where students should be given more control on the e-learning content. They should be given the control to select and present the tasks and content, as well as the transfer process, according to their needs and preferences. The findings of the study also support the work of Stray and Totter (2006).

According to the respondents, the primary challenge in distance teaching include the inability to reach new populations of learners, the lack of opportunity to work with better prepared and more motivated students, no flexibility in work schedule, and the inability to use a broader range of media-based resources to support e-learning in distance education.

Again, they stated that another challenge is that the learner characteristics required for the online student can create obstacles to both teaching and learning. For example, some students are used to learning through interaction in the classroom. They may find that an online course in e-learning does not provide them with the support they are used to.

Another study by Attwell (2007) also indicated staff poor tendency to create and have more control of their learning environment with lecturers' role as a facilitator and adviser and the features provided by e-learning as a major challenge staff face when using e-learning platform. This result is in contrast with the finding by DeVries and Rugg (2004) who listed different challenges staff face when using the e-learning platform. They stated that one of the initial problems with teaching via videoconferencing using e-learning still is the poor quality of the picture, even in the best of ISDN systems. Staff first needs to get used to the "jerky" pictures inferior to the TV picture before they can start coping with the real educational aspects of the situation. Desktop video conference systems are even worse in this respect.

Recommendations

1. Staff should be very clear about the multiple roles they should prepare for and take on while implementing e-learning, have the corresponding changing role-related skills and competencies in order to provide high quality platform for distance education learners.
2. Teaching at a distance can be a pleasurable experience for everyone involved, staff and student alike. Staff maintaining e-learning platform should make it interesting to motivate learners to remain active, thereby making it a valuable learning experience as well as fun.
3. Staff managing the e-learning platform should use synchronous conferencing tools that will enable students to bring more issues to their attention as well as to their peers as they interact and provide just-in-time course feedback.
4. If e-learning is to have a meaningful role in higher education, it is important that universities focus on students' attitudes and their expectations with regard to the role of e-learning within the higher education experiences.

References

[1] Anderson, T. (2005). Distance learning – Social software's killer app? Retrieved: September 18, from: http://www.unisa.edu.au/odlaaconference/PPDF2s/13%20odlaa%20Anderson.pdf

[2] Arsun, O. I. & Kuru, S. (2006) Innovative, Inclusive, Interactive & Intercultural learning campus Draft Exploitation Model. In: O.I. Arsun & S. Kuru (edt.) Retrieved: March 12, 2007 from:http://edu.wu-wien.ac.at/icamp/fileadmin/deliverables/D5.2_icamp_exploitation- model- draft.pdf

[3] Bates, T. (2005). *Technology e-learning and Distance Education.(2nd Edition)*. Newyork, Routledge.

[4] Beaudoin, M. (1990) The Instructor's Changing Role in Distance Education. *The American Journal of Distance Education, 4*(2), (1990)

[5] Berge, Z. L. (1992). The Role of the Online Instructor/facilitator Retrieved from http://www.emoderators.com/moderators/teach_online.html

[6] Borja, B. and Rhea R. (2005). Cyber Schools' Status. *Education Week.1* (24)35.

[7] Bracher, M. (2009). *Radical Pedagogy: Identity, Generativity, and Social Transformation*. New York & Hampshire: Palgrave Macmillan.

[8] Darmaningtyas (D.E.) & Subkhan, E. (2012). *Manipulasi Kebijakan Pendidikan*. Yogyakarta: Resist Book.

[9] Davis, N.E. & Roblyer, M.D. (2005). Preparing Teachers for the Schools That Technology Built. *Journal of Research on Technology in Education. 3*(7)4.

[10] De Lissovoy, N. (2008). *Power, Crisis, and Education for Liberation: Rethinking Critical Pedagogy*. New York & Hampshire: Palgrave Macmillan.

[11] Feenberg, A. (2002). *Transforming Technology: A Critical Technology Revisited.* Oxford: Oxford University Press.

[12] Freire, P. (2005). *Pedagogy of the Oppressed*. 30th Anniversary Edition. New York & London: Continuum.

[13] Garrison, D. R. and Shale, D. "Mapping the Boundaries of Distance Education: Problems in Defining the Field", *American Journal of Distance Education, (1)1, (1987)*

[14] Gray, D. L. "Virtual High Schools: A Case Study to Explore Why Students, Parents, and Teachers Choose This Type of Alternative Education", Doctorial Dissertation, University of Denver, (2005) "K-12 Issues News, Reviews, Resources, and Tools Technology Teaching", retrieved from http://www.distanceeducator.com/k12/

[15] Keegan, D. "Problems in Defining the Field of Distance Education", *American Journal of Distance Education, 2(2), (1988)*

[16] Knowles, M.S. "*The Modern Practice of Adult Education: From Pedagogy to Andragog*", Prentice Hall, Englewood Cliffs, NJ, (1980)

[17] Moore, M. G. and Anderson, W. G., "Handbook of Distance Education", Mahwah, NJ, (2003)

[18] Moore, M. G. "Constructivists: Don't Blame the Tools*", American Journal of Distance Education (18)2, 67-72, (2004)*

[19] Moore, M. and Kearsley, G., "*Distance Education A Systems View",* Thomson Wadsworth, (2005)

[20] Muirhead, B. "Practical Strategies for Teaching Computer-Mediated Classes", *Ed Journal (15)50(2001)*,retrievedfromhttp://www.usdla.org/html/journal/may01_Issue/article02.htl.

[21] Rothermel, M. "Development and Management of Virtual Schools: Issues and Trends", The Quarterly Review of Distance Education (6)2, pps 173-176, (2005)

[22] Sellers, R. "Learning to Teach in a Virtual Environment: A Case Study of the Louisiana Virtual Classroom Teachers", Doctoral dissertation, Louisiana State University, (2001)

[23] Sherry, L. "Issues in Distance Learning". *International Journal of Educational Telecommunications 1(4), 337-365, (1995)*

[24] Smith, T. C., "Fifty-One Competencies for Online Instruction*", Journal of Educators Online, (2)2, (2005)*

[25] Tam, M. "Constructivism, Instructional Design, and Technology: Implications for Transforming Distance Learning", Educational Technology and Society (3)2, (2000)

[30] Wolf, P. D. "Best Practices in the Training of Faculty to Teach Online", Doctorial Dissertation, University of Maryland, (2004)

Post Graduate Students Readiness for Elearning (A Case Study at the College of Distance Education, University of Cape Coast)

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Abstract

The use of eLearning is changing teaching and learning processes from the sage on the stage to the guide on the side approach. Students can easily access their study materials on an eLearning platform regardless of time and space through digital means. In this research, Post Graduate students of the College of Distance Education (CoDE) of the university of Cape Coast, offering Business and Education programmes were assessed on their readiness for the use of the College of Distance Education's eLearning platform. A total number of 60 students enrolled for the 2015-2016 Academic Year using the eLearning platform were sampled for the study. A questionnaire was administered to all of the students to assess their perceived self efficacy in the use of ICT tools, their attitude towards eLearning and the perceived barriers to the use of an eLearning platform. Research findings showed that most students had a positive attitude towards the use of ICT tools and were ready to use the eLearning platform.

Key words: *eLearning, sage on the stage, guide on the side, readiness, attitude, self efficacy*

Introduction

The rapid pace of technological and economic developments has placed greater demands on education systems to function well. The crucial need for students is to focus on the importance of lifelong learning, that is, to continuously upgrade their knowledge and skills, to think critically and to inspire creativity and innovation (UNESCO, 2004). Recently, a new paradigm of teaching and learning processes have emerged. eLearning has emerged as a result of the rapid diffusion of Information and Communication Technology (ICT) in educational setups.

eLearning has been defined as the use of applications and processes such as web-based learning, computer-based learning, virtual classrooms and digital collaboration. It includes the delivery of content via internet, audio and videotape, satellite broadcast, interactive TV, and CD-ROM. The explosion of the knowledge age has changed the context of what is learnt through eLearning and this is a manifestation of a knowledge revolution. eLearning is basically a virtual learning environment where courses are delivered through digital means via the Internet (Cruthers, 2008). Bates (2005), also defines eLearning as a subcategory of distance education that specifically uses the Internet and the World Wide Web

Over the last decade and a half, distance education has undergone a period of considerable transformation. The growth of the internet and related technologies has resulted in a merging of eLearning into the routine practices of universities and has given distance education a new appeal.

Simply having eLearning facilities available in the universities will not guarantee their effective use. Regardless of the quantity and quality of technology placed in the universities, the key to how eLearning tools are used places a prime focus on students; who must have the competence and the right attitude towards technology (Kadel, 2005) and readiness of acceptance of use. Attitudes refers to one's positive or negative judgment about a concrete subject.

Technology helps students to achieve their educational goals and create new chances and choices. However, these chances and choices to use technologies that extend the learning

environment may be influenced by students' attitudes and behavioral intentions towards a new system of learning hence there arises the need to assess their perceptions and attitudes towards technology use in their learning leverage. Therefore, investigating post graduate students of the College of Distance Education, University of Cape Coast (UCC) student's readiness for eLearning is important for the success of improving university education and expanding the frontiers of distance education.

Statement of the Problem

The acceptance of new technologies has been the subject of a plethora of diverse studies in the past two decades to improve university education. The core investigation of the study is to assess student's readiness for eLearning, challenges students are likely to face when using the eLearning platform.

To this end, answers to the following research question were sought:

Research Questions

1. What is the attitude of CoDE UCC Post graduate students towards eLearning ?
2. How do CoDE UCC Post graduate students perceive their self-efficacy in the use of eLearning tools?
3. What are the likely barriers which may hinder the integration of eLearning at CoDE ?

Review of Related Literature

Attitude

Attitude refers to one's perception towards an object and it may be positive or negative. Student's attitudes towards computers then stand for students' evaluation and perceptions of self regarding how they feel about utilizing computers in their own learning practices. Student's attitudes towards eLearning is essential because students take on a major role in deciding on the extent to which computer use is allowed or hindered in learning.

Several studies (Deniz, 2007; Yuen & Ma, 2001) indicate that students' computer competence plays a key role in developing positive attitudes towards computers. On the other hand, Yildirim (2000) posits that computer anxiety and liking significantly affect student attitudes. That is students with low levels of computer anxiety and high levels of computer liking are identified with more positive attitudes whilst those with high anxiety and low levels of computer liking are identified with negative attitudes.

Measuring Students Readiness Towards eLearning

The concept of readiness for eLearning was proposed in the Australian vocational education and training sector by Warner, Christie, and Choy (1998). They defined readiness for eLearning in terms of three aspects:

1. Students' preferences for the form of delivery as opposed to face-to-face classroom instruction.
2. Student confidence in using electronic communication for learning and, in particular, competence and confidence in the use of Internet and computer-mediated communication.
3. Ability to engage in autonomous learning.

In order to concretize the readiness concepts, McVay (2001) developed a 13-item instrument for measuring readiness for eLearning. The instrument focused on student behavior and attitudes as the predictors. Later, Smith et al., (2003) conducted an exploratory study to test McVay's (2000) Readiness for eLearning questionnaire. The instrument was administered to 107 undergraduate university students in the United States and Australia and yielded a two-factor structure, "Comfort with e-learning" and "Self-management of learning". The former one, or the need for self-direction, was recognizable as an eLearning-focused dimension identified by Smith (2005) for its broader set of resource-based flexible learning materials. The latter one permeated the concept of distance education, regarding which Evans

(2000) commented that self-direction is a prerequisite for effective resource-based learning in distance education.

Motivation for eLearning

Schunk, Pintrich, and Meece (2008) define motivation as "the process whereby goal-directed activity is instigated and sustained" (p. 4). Research shows that motivated learners are more likely to undertake challenging activities, to be actively engaged, to enjoy and adopt a deep approach to learning, and to exhibit enhanced performance, persistence, and creativity (Schunk et al., 2008).

According to Deci and Ryan (2000), intrinsic motivation is a critical element in cognitive, social, and physical development because it is through acting on one's inherent interests that one grows in knowledge and skills. Intrinsic motivation was found to be associated with a lower dropout rate, higher-quality learning, and better learning strategies (Czubaj, 2004).

Many students still find it hard to adapt and perform well when using university eLearning tools because of the demands and stress of the transition from secondary schools to tertiary education. Some students struggle to cope with the complexity of an eLearning environment and often have doubts about their learning performance (Saadé & Kira, 2009).

Computer and Internet Self-Efficacy

In eLearning, self-efficacy is considered to be a key psychological contributing factor to students' success (Pajares, 1996).This is because it can alter students' perceptions of their learning environment. Self-efficacy is not only a good predictor of learners' academic outcomes but it helps learners well adjust and handle with the unfamiliar learning environment, even when they have little or prior eLearning experience (Swan, 2004).

Tsai and Tsai (2003) showed that students with high internet self-efficacy learned better than students with low internet self-efficacy in a web-based learning task. Tsai and Lin (2004) explored adolescents' perceptions and attitudes regarding the internet among 636 high school students and found that females were more likely than males to perceive internet as pragmatic and that males' enjoyment of the internet was greater than females' corresponding enjoyment.

Barriers to the Use of ICT in Education

A challenge is anything that retards the progress of any set objective. It therefore means that the removal of one or more of these challenges or barriers such as the ones in ICT integration should assist perhaps significantly advance the process of integration. In a research report conducted by British Educational Communications and Technology Agency (BECTA) in 2004, a number of other important barriers were identified. These were: lack of confidence, accessibility, lack of time, fear of change, poor appreciation of ICT and age.

Research Methodology

Descriptive survey design was adopted in this study. The target population was all post graduate distance students of UCC in Ghana. Purposive sampling method was used to select sixty students, twenty students were selected from each of the study centres and the instruments used to collect data were questionnaire.

Results and Discussion

The socio-demographic characteristics considered in the study are sex, age, study centre and programme offering. Out of 60 students sampled for the study, 55 (91.6%) valid questionnaires were retrieved. The details of the responses are presented in Table 1.

Table 1: Demographic Characteristics of the Respondents

Item (Question: Q)	Frequency	Percentage
Q1: Sex:		
Male	35	63.6
Female	20	36.4

Q2: Age:		
Under 25 Years	1	1.8
26 – 30 Years	18	32.7
31 – 35 Years	21	38.2
36 – 40 Years	9	16.4
41 – 45 Years	5 9	1
46 – 50 Years	1	1.8
51 – 55 Years	-	-
55 – 60 Years	-	-
Q3: Study Centre:		
Accra	15	27.3
Cape Coast	20	36.4
Kumasi	20	36.4
Q4: Programme:		
M.Ed Measurement and Evaluation	8	14.5
M.Ed Administration in Higher Education	13	23.6
M.Ed Education Psychology	7	12.7
M.COM in Accounting	6	10.9
MBA in Human Resource Management	6	10.9
MBA in Accounting	9	16.4
MBA in Finance	6	10.9

The data in Table 1 above shows that as many as 35 (63.6%) of the respondents were males whiles the remaining 20 (36.4%) were females. From the above it can be concluded that majority of the students used in the study were males.

The age distribution of the respondents indicates that 1 (1.8%) of them fell under the twenty five (25) age bracket. Eighteen (32.7%) and 21 (38.2%) of the respondents fell in the 26 – 30 and 31 – 35 age brackets. Nine (16.4%) and 5 (9.1%) of them respectively fell in the 36 – 40 and 41 – 45 age brackets. The remaining 1 (1.8%) fell in the 46 – 50 age bracket. None of the respondents felt in the age bracket of 51 – 55 and 56 – 60 bracket. The age distribution of the students generally reflects the situation within post graduate students age group in Ghana (Vorkeh, 2004).

Regarding the various programmes being offered, the data also shows that 6 (10.9%) of the respondents are offering Master of Commerce in Accounting, Master of Business Administration in Human Resource Management and Master of Business Administration in Banking and Finance. Again, 8 (14.5%) were offering Master of Education in Measurement and Evaluation, 13 (23.6%) offering Master of Education in Administration in Higher Education, 7 (12.7%) were doing Master of Education in Psychology and 9 (16.4%) were offering Master of Business Administration in Accounting. The respondents study centers are Accra, Cape Coast and Kumasi.

Research Question 1: What is the Attitude of CoDE UCC Post Graduate Students towards eLearning?

The successful integration of computers in educational environments depends, to a great extent, on students' attitudes towards eLearning. In trying to answer the objective above the following were looked at. The first thing was to find out from respondents whether they will consent to or go against the statement that I like using computers/laptop/iPad for research, I like to communicate with others using email to support my learning, I do not have enough time to use computers or laptop, I could look stupid if something goes wrong and Computers are a thing for young people.

Table 2: Students Responses on Usage of Computers/Laptop/iPad for Research

Responses	Frequency	Percentage
Strongly disagree	1	1.8

Disagree	1	1.8
Indecisive	3	5.5
Agree	17	30.9
Strongly agree	33	60.0
Total	**55**	**100**

Source: Field survey, 2015.

Table 2 shows that 1 (1.8%) and 1 (1.8%) of the respondents respectively strongly disagreed and disagreed to the assertion that they like using laptop/iPad. Three (5.5%) were indecisive whilst 17 (30.9%) agreeing. The remaining 33 (60.0%) strongly agreed. It can be concluded that majority of the respondents were convinced that they like using computers or laptop/iPad for research. Majority 53 (98.1%) of the respondents concluded that they have personal computers or laptop/iPad, which easily motivates them to use these devices. The findings of the study also support the work of Habitzel and his colleagues (2006).

Table 3: Students Responses on Communicating with Others Using Email

Responses	Frequency	Percentage
Strongly disagree	2	3.6
Disagree	4	7.3
Indecisive	5	9.1
Agree	32	58.2
Strongly agree	12	21.8
Total	**55**	**100**

Source: Field survey, 2015.

The findings in Table 3 reveals that 2 (3.6%) and 4 (7.3%) of the respondents respectively strongly disagreed and disagreed to the assertion that they like to communicate with others using email to support learning. Five (9.1%) were indecisive with 32 (58.2%) agreeing. The remaining 12 (21.8%) strongly agreed. From the above it can be concluded that majority of the respondents were convinced that they like to communicate with others using email to support learning. Majority, 54 (94.7%) of the respondents concluded that they use their laptop/iPad frequently when using eLearning services. The finding supports the work of Attwell (2007), who concluded that social networking support personal learning of students.

Table 4: Students Responses on Availability of Time to Use Computer or Laptop

Responses	Frequency	Percentage
Strongly disagree	10	18.2
Disagree	10	18.2
Indecisive	2	3.6
Agree	25	45.5
Strongly agree	8	14.5
Total	**55**	**100**

Source: Field survey, 2015.

Table 4 shows that 10 (18.2%) and 10 (18.2%) of the respondents respectively strongly disagreed and disagreed to the assertion that they do not have enough time to use computers. Two (3.6%) were indecisive with 25 (45.5%) agreeing. The remaining 8 (14.5%) strongly agreed. It can be concluded that majority of the students were convinced that they do not have enough time to use computers. However, this result contradicts the findings of Attwell (2007).

Table 5: Students Responses on If Something Goes Wrong when Using Computers

Responses	Frequency	Percentage
Strongly disagree	26	48.1
Disagree	14	25.9
Indecisive	7	13.0

Agree	5	9.3
Strongly agree	2	3.7
Total	**55**	**100**

Source: Field survey, 2015.

It can be seen that 26 (48.1%) and 14 (25.9%) of the respondents respectively strongly disagreed and disagreed that the they could look stupid if something goes wrong when working with computers or laptop. Five (9.3%) of them agreed to the statement that they could look stupid if something goes wrong in the course of their usage of the computer and 2 (3.7%) of the respondents strongly agreed that they could look stupid if something goes wrong whenever they are using the computer.

In all, we can conclude that UCC post graduate distance students have positive attitude towards eLearning which predicts the need for learning computing skills which will in turn enhance ICT or computing skills.

Again, the mean helped to find out the overall attitude of the respondents towards the use of eLearning. The details are provided in Table 6.

Table 6: Mean of Means Attitude of the Respondents

Variable	Mean	Standard Deviation
Attitude	3.261	3.610

1 – 2.44 = Low/Poor; 2.45 – 2.9 = Moderate; 3.0 – 4.0 = High/Good
Source: Field survey, 2015.

Overall, the mean attitude implies that the respondents have good attitude towards the use of eLearning. The finding supports the work of Varank (2006), who concluded that students have positive attitude towards the use of eLearning in their studies.

Research Question 2: How do UCC Code Students Perceive their Self-efficacy on ELearning Learning?

Attempts were made to find students own self-efficacy on the use of the internet. The following were looked into: I know how to send and receive email messages, I can use various search engines to search for information, I would rather listen to a lecture than read the material from a computer screen, I would rather find out information using a computer than from a lecturer, I cannot learn using only computers; I need lecturer-student contact, I often use the discussion boards to assist my learning, I often use eLearning lecture materials to assist my learning and I often use eLearning lecture recordings for my studies.

Table 7: Students Responses on How to Send and Receive Email Messages

Responses	Frequency	Percentage
Strongly disagree	1	1.8
Disagree	-	-
Indecisive	-	-
Agree	2	3.6
Strongly agree	52	94.5
Total	**55**	**100**

Source: Field survey, 2015.

From Table 7, 1 (1.8%) of the respondents strongly disagreed that they know how to send and receive email messages, 2 (3.6%) agreed and 52 (94.5%) strongly agreed that they know how to send and receive email messages. None of the respondents disagreed nor were indecisive. From the above, it can be deduced that majority of the respondents knew how to send and receive email messages and that most graduate students know how to send and receive email messages.

Meanwhile, 1 (1.9%) of the respondents strongly disagreed that they can use various search engines to research for information, 4 (7.7%) of the respondents disagreed with the statement,

9 (17.3%) were indecisive, 26 (50.0%) of the respondents agreed that they can use various search engines to research for information and 12 (23.1%) strongly agreed that they can use various search engines to search for information. From the above, it can be deduced majority of the respondents knew how to use various search engines to research for information. This findings support the research of Swan (2004) who concluded that majority of post graduate students know how to use search engines to search for information on the internet.

Students were further asked to state their choice of preference in listening to a lecture and reading their learning materials from a computer screen. The details of their responses are provided in figure 1.

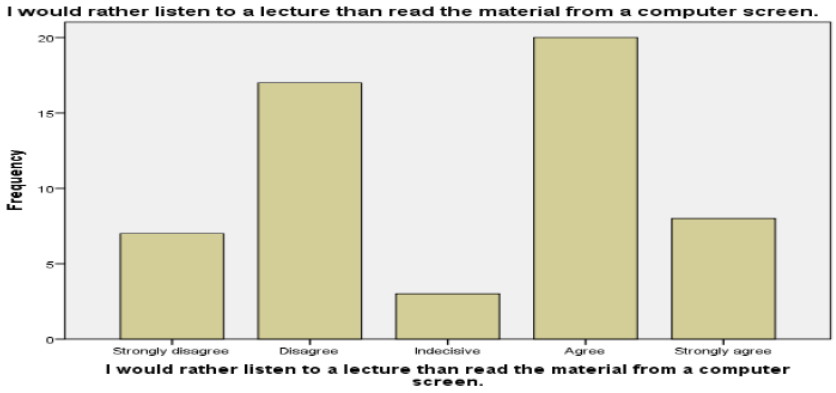

Figure 1: I would rather listen to a lecture than read the material from a computer screen

Source: Field survey, 2015.

Figure 1 shows that 7 (12.7%) and 17 (30.9%) of the respondents strongly disagreed and disagreed respectively that they would rather listen to a lecturer than read the material from a computer screen. Three (5.5%) of the respondents were indecisive, 20 (36.4%) agreed and 8 (14.5%) strongly agreed that they would rather listen to a lecturer than read the material from a computer screen. Most of the respondents concluded that they would rather listen to a lecturer than read the material from a computer screen. This conclusion does not support the findings of Watkins and Leigh (2004), who concluded that most students prefer to learn from their computer screen than listening only from their lecturers.

Attempts were further made to find out from the respondents on their usage of discussion boards in assisting them in their studies and the details are provided in Table 8.

Table 8: Students Responses on the Use of ELearning Discussion Board

Responses	Frequency	Percentage
Strongly disagree	17	30.9
Disagree	24	43.6
Indecisive	4	7.3
Agree	6	10.9
Strongly agree	4	7.3
Total	**55**	**100**

Source: Field survey, 2015.

The data in Table 8 reveals that 17 (30.9%) of the respondents strongly disagreed that they often use eLearning discussion board to assist in their learning, 24 (43.6%) disagreed with the statement, 4 (7.3%) were indecisive, 6 (10.9%) agreed that they often use eLearning discussion boards to assist their learning and 4 (7.3%) strongly agreed that they often use eLearning discussion board to assist their learning. From the above, it can be deduced that majority of the respondents do not use eLearning discussion boards to assist in their learning.

Research Question 3: What are the Barriers or Factors Hindering the Integration of eLearning in the UCC CoDE Programme?

In trying to answer this question, respondents were asked what was preventing them from using eLearning during their studies. Their responses are presented in Table 9.

Table 9: Students Responses on Factors Hindering their use of eLearning

Responses	Frequency	Percentage
Lack of confidence	2	3.9
Computer equipment is unreliable	4	7.8
Not sure how useful computers are	1	2.0
No support if something goes wrong with computer	28	54.9
Equipment available to me for eLearning is unreliable	16	31.4
Total	**51**	**100**

Source: Field survey, 2015.

It can be seen from Table 10 that 2 (3.9%) and 4 (7.8%) responses each respectively went in favour of lack of confidence about computers and because computer equipment is unreliable reasons are preventing them from using eLearning. One (2.0%) and 28 (54.9%) of the response also went in favour of not sure how useful computers are and having no support if something goes wrong with their computer as a major factor restraining them from using eLearning. The remaining responses 16 (31.4%) attributed it to unreliability of equipment available. Findings from related works indicate that different factors contribute to successful eLearning in an institution (Johnson & Maddux, 2006).

Recommendations

1. eLearning readiness assessment and training for students should be administered earlier prior to their enrolment into the program.
2. Strategies should be in place to support students whose preference is predominantly on face-to-face learning. This may include the use of assessment tasks that are designed to encourage active participation through such existing tool as the discussion board.
3. College of Distance Education should create an atmosphere that will encourage and facilitate collaborative learning which is central to the success of eLearning.
4. A range of intensive workshops could be offered to students who have little interest in eLearning. These workshops should mainly focus on how to use eLearning tools as well as strategies for eLearning success. ELearning resource toolkits based on such strategies should also be developed and made available for ready referencing.
5. Training should be organized for course conveners on how to effectively design and deliver eLearning courses. This is particularly important as pedagogical soundness is fundamental to effective eLearning.

References

[1] Attwell, G. (2007). The Personal Learning Environments - the future of eLearning?, *eLearning Papers*, *2*(1).

[2] Bates, A. W. (2005). *Technology, e-learning and distance education* (2nd ed.). New York: Routledge Falmer.

[3] Cruthers, M. (2008). Education technology gives teachers a wider reach. ETNI, 5. Retrieved October 10, 2015, from http://www.etni.org.il/etnirag/issue5/mark_cruthers.htm.

[4] Czubaj, C. A. (2004). Literature review: Reported educator concerns regarding cyberspace curricula. Education, *124*(4), 676–683.

[5] Deci, E. L., & Ryan, R. M. (2002). The paradox of achievement: The harder you push, the worse it gets. In J. Aronson (Ed.), *Improving academic achievement* (pp. 61-87). New York: Academic Press.

[6] Deniz, L. (2007). İlköğretim Okullarında Görev Yapan Sınıf ve Alan Öğretmenlerinin Bilgisayar Tutumları. *The Turkish ELearning Journal of Educational Technology*, *4*(4).

[7] Evans, T. (2000). Flexible delivery and flexible learning: developing flexible learners? In V. Jakupec, & J. Garrick (Eds.), Flexible learning, human resource and organizational development (pp. 211–224) London: Routledge.

[8] Habitzel, K., Mark, T., Stehno, B., & Prock, S. (2006). Micro-learning; Emerging concepts, practices and technologies after e-learning. Proceeding of Micro learning 2005 Learning & Working in New Media, In conference Series: Innsbruck University press:

[9] Kadel, R. (2005). How teacher attitude affect technology. *Learning and Leading with Technology, 39*(5), 34-47.

[10] Kozma, R. (2008). National Policies that Connect ICT-Based Education reform to Economic and Social Development, Human Technology, *1*(2), 117-156.

[11] Larreamendy-Joerns, J., & Leinhardt, G. (2006). Going the distance with eLearning education. *Review of Educational Research, 76*(4), 567-605.

[12] McVay, M. (2001). How to be a successful distance learning student: *Learning on the Internet*. New York: Prentice Hall.

[13] OECD (2009). Education at a glance: OECD Indicators, Paris: OECD Publishing.

[14] Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543-578.

[15] Pelgrum, W. & Law, N. (2000). ICT in education around the world: Trends, problems and prospects, Paris: UNESCO, International Institute for Educational Planning.

[16] Saadé, R. G., & Kira, D. (2009). Computer anxiety in e-learning: the effect of computer self-efficacy. *Journal of Information Technology Education, 8*, 177-191.

[17] Schunk, D., Pintrich, M., & Meece, L. (2008). Self-efficacy and education and instruction. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 281-303). New York, NY: Plenum Pres.

[18] Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education* (3rd ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

[19] Smith, P. J. (2005). Preparedness for flexible delivery among vocational learners. Distance Education, *21*(1), 29–48.

[20] Smith, P. J., Murphy, K. L., & Mahoney, S. E. (2003). Towards identifying factors underlying readiness for eLearning learning: an exploratory study. Distance Education, *24*(1), 57–67.

[21] Swan, K. (2004). *Learning eLearning: a review of current research on issues of interface, teaching presence and learner characteristics.* Paper presented at the Elements of Quality ELearning Education, Needham, MA.

[22] Tsai, C. C., & Lin, C. C. (2004). Taiwanese adolescents' perceptions and attitudes regarding the Internet: exploring gender differences. Adolescence, *39*, 725–734.

[23] Tsai, M. J., & Tsai, C. C. (2003). Information searching strategies in web-based science learning: the role of Internet self-efficacy. Innovations in Education and Teaching International, *40*(1), 43–50.

[24] UNESCO. (2004). *Open and distance learning: Trends, policy, and strategy considerations*. Paris: UNESCO.

[25] Varank, I. (2006). A comparison of a computer based and a lecture based computer literacy course: A Turkish case, *Eurasia Journal of Mathematics, Science and Technology Education*, *2*(3), 112-123.

[26] Warner, D., Christie, G., & Choy, S. (1998). Readiness of VET clients for flexible delivery including on-line learning. Brisbane: Australian National Training Authority.

[27] Watkins, J. F., & Leigh, S. (2004). *Education Evolution: The Need to Keep Pace with Development of K-12 ELearning Learning*. Naperville, IL: Learning Point Associates.

[28] Yildirim, S. (2000). Current utilization of ICT in Turkish basic education schools: A review of

[29] Teacher's ICT use and barriers to integration. *International Journal of Instructional Media*, Vol. *34,* No.2, pp. 171-86.

[30] Yuen, H. K., & Ma, W. K. (2001). Gender differences in teacher computer acceptance. *Journal of Technology and Teacher Education, 10*(3), 365-382.

Challenges Facing Nursing Mothers in Distance Learning in the Upper West Region of Ghana: A Recipe for Policy Formulation.

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Abstract

It is obvious that women will love to have children for their husbands in the Ghanaian society. However, with the increasing responsibilities of women in society it has become a challenge for women to have children while fulfilling their new responsibilities in society. Before now the core role of women in society was to produce children, cook for their husbands, and respond to their sexual advances when needed. On the other hand, men work to bring resources home. The situation has changed in contemporary times whereby women have to work to support their husbands to keep the home financially. The purpose of the study is to identify and evaluate the educational challenges facing nursing mothers on distance education programs in the Upper West Region of Ghana. It is also to identify strategies and interventions in dealing with nursing mothers to create a healthy learning environment for academic success. The study adopted a case study design, and purposive sampling was used to select all available nursing mothers taking part in College of Distance Education University of Cape Coast distance education program. A questionnaire was used to gather information from thirty-one (31) nursing mothers. Data was analyzed using descriptive statistics and analysis. The results show that nursing mothers face numerous challenges while seeking for further education. The major ones been the lack of accommodation for their babies and babysitters, and competing equally with other students in terms of time during the examination. The nursing mothers suggested separate room for them during examinations as well as extra time for the inconveniences the babies create during examinations.

Background to the Study

There is enough literature to show that education is the wheel for the development of people and a nation (Tyack and Cuban, 1995). Governments across the world are putting in more resources to develop the education sector because they know that education is the key to development. Other organizations that are partners in development do not hesitate to contribute to the development of education in the country they are operating. The development of education in a country starts with the people who enroll in the schools provided by the education sector. The development of very person matters in society. Therefore, governments are concerned about the number of people enrolling in schools. They usually advocate for compulsory enrollment. Thus, we have policies such as the Free Compulsory Universal Basic Education (FCUBE) in Ghana that aims at making education free and compulsory to every Ghanaian (Ministry of Education, 2013). In modern times, the definitions of what constitute schooling or education have changed drastically. The reason for the change has been the adoption of distance education as another form of providing education to the citizenry. Distance education is fairly new in the Ghanaian context as compared to other countries like the US, Canada and India. Since its inception, it has become one of the fastest growing educational programmes in the country as compared with other educational interventions such as the non-formal educational system. Today, over thousands of students are offering distance learning programmes across the many tertiary educational institutions in the country. Among these students are nursing mothers who are of great interest to the current research. Common observation indicates that you can identify one nursing mothers among every twenty students in distance learning in the Upper West Region of Ghana. Students in distance learning in the Upper West Region of Ghana are expected to attend face-to-face sessions, write teacher made test quizzes and also submit assignments.

They are also mandated to write end of semester examination. During the face-to-face sessions, students are expected to write notes and contribute to discussions. Depending on the level students are expected to complete not less than twenty courses per the entire program or seventy-two credit hours. Considering the heavy responsibilities placed on the distance learner there is no choice but for the researcher to speculate on how the nursing mothers in distance learning cope with the situation for academic excellence (Edwards, Hanson, and Ragatt, 1996). It is very likely to think that the nursing mother in distance education faces a lot of challenges. However, that perception is for the nursing mother to decide. Studies have shown that where there is adult learning there is bound to be nursing mothers. Currently, there are an increasing number of students getting pregnant while in school, and it cut across all levels of the adult education ladder. There are instances whereby girls have dropped out of school due to pregnancy-related cases (Amina, 2015). However, lifelong education is giving women the chance to school and have babies at the same time. The opportunity comes with its challenges since nursing mothers sometimes skip school to take care of their sick babies. When babies are brought to face-to-face centres, mothers may have to share time for discussions with cleaning up dirt from babies due to their activities. It is very common for nursing mothers to absent themselves from face-to-face sessions due to their babies' ill health. Also, they have to feed babies intermittently at the expense of taking part in discussions.

Society expects a lot from adults. Adults are given the responsibility of socializing the younger and upcoming generation. This responsibility cannot function well if the adult expectations and abilities are not coherent with the youth they are supposed to guide. It is expected that people at early adulthood would have achieved their educational aspirations. These aspirations include acquiring skills, and knowledge that will make them useful to society. They can be made useful in the sense that they can add to the growth rate of the economy. It is against this background that adults in society see the need to have an education to the highest level so that they can function effectively as adults in society. The idea of adults venturing into education comes with its set of challenges. Governments are making provision for nursing mothers to take care of their babies' whiles they work. A case in point is where the American Academy of Pediatrics recommends exclusive breastfeeding for at least the first six months of the life of every baby (United States Office of Personnel Management, 2013). Thus, the government has to put in place policies to ensure that nursing mothers can breastfeed their babies while they work. When students find themselves as nursing mothers, then they are playing the role of mothers and students at the same time. This role can be a challenging one and for that matter needs attention from all stakeholders of education just like the case of the nursing/working mother. Adults who are engaged in schooling have a higher responsibility to accomplish as compared to students who in their prime age. The reason given was that most adult learners are engaged in educational activities and mothering as well. It is true that adult learners have challenges to face, but they can overcome these challenges by defining their internal purpose of life. Once they have clear cut visions of life they can play their role diligently to achieve those purposes of life.

Support services are an essential element in the life of a student. However, findings from a study conducted by Dhillon, McGowan, and Wang (2015) indicated that there are discrepancies between the officially declared provision of the services and the realities on the ground. In other words, the accessibility and use of these services in practice does not reflect the real situation at hand. An adult learner can succeed in their multiple roles when exposed to student support services. It can enable them live a balanced life full of purposes and achievements, away from the stress and challenges emanating from the multiple responsibility they have to accomplish. Currently, there is no separate curriculum for adult learners, and they have to battle it out with all the other competitors in the education field. Parenting and schooling are two great exercises that do not compromise each other. In some cases, mothers look for babysitters to take care of the babies while they attend school. Not all mothers are privileged to hire the services of a babysitter. Thus, the work of babysitting is done by the mothers while they school also. We may want to ask ourselves if it is right to have babies

while schooling. The answer is a yes no situation because some nursing mothers may end up losing everything if they fail to secure the right grades to sustain them in school. On the other hand, they lack the full attention for their babies because they are in class at a time the baby needs them (United States Office of Personnel Management, 2013). The situation can be critical to the extent that babies become sick and lose their lives. Deciding to have babies whiles schooling is a big challenge. It is a decision to be taken and been ready to face the challenges. The challenge ranges from their social roles, academic roles, and family roles. These roles are very significant in the life of the adult because they serve as the benchmark upon which the adult status is measured. Each of the social group has a role to play. The youth and the early adulthood have their role to play. The adult also has their role to play. Together, these roles represent a network of cohesion that moves nations forward.

In most cases, the way forward is for the nursing mother to hire a babysitter. In the Upper West Region is not a professional business. It is done locally, with young girls who may also be schooling or are out of school for various reasons including poverty. Even the idea of a babysitter comes with mix feelings. The reason is that society has negative ideas about what babysitters does to babies left in their care. According to Nash (2010), articles about babysitting focus on behaviour issues of girls offering those services. They portray them as disruptive and irresponsible in their duties towards the babies under their care. Also, they also lack proper maternalism (Nash, 2010). According to Tomlin (2008), Socialization is crucial in the development process of a child. Socialization offers an opportunity for children to become functioning members of society. Thus, children take on the values and beliefs of the society they belong. Various societies have suggested ways of bringing up children to socialize them into the larger community. Failure to do so can result in bringing up children into adults who do not fit well into society. The idea of men taking part in babysitting has met with serious challenges in some societies where they belief it is the sole responsibility of women. It also include other believes such as the place of a woman is in the kitchen (Skjortnes & Zachariassen, 2010). While parents play their role in the socialization process, the media also complement their efforts through video games, newspapers, comic books, radio, magazines, movies, and the television (Gonzalez-Mena, 2010).

There is a common belief that babies are from God in the African traditional religion. The perception has influence people attitude towards family life issues. The result is that less precaution is given to when to have babies. In some jurisdictions, it is prohibited to practice family planning. A decision to practice family planning can result in a woman losing her marriage. Men should have equal responsibility of baby nursing to ease the tension on nursing mothers. In line with this view, the feminist theory advocates for equality between males and females in the area of their traditional duties and responsibilities. For example, babysitting is seen as a female responsibility when it should have been treated as a social responsibility for both males and females. Thus, the feminist theory advocates for shared responsibility when it comes to nursing babies. The idea of men taking part in the nursing of babies has met with several challenges. It is a relatively new concept in the African traditional societies, and men have opposed to it believing women want to subvert their powers as heads of the family. It some cases, the issue have led to a breakdown in marriages simple because some women want to exercise their rights.

Whether nursing mothers who are into distance learning programs are knowledgeable about family life education, is another issue that needs to be an investigation. However, one fact is clear which is that nursing mothers will gain a lot from knowing family life education (Goldin, and Katz, 2008). The program teaches participants on when, how, where, what are necessary when we chose to have babies. All persons entering an adult life that include getting marriage must be introduced to family life education. It will prepare them for motherhood and parenting as well. It may also help them to make informed decisions as to when to have babies (Goldin, and Katz, 2008). According to a report by Boulton-Lewis (2010) populations are ageing rapidly, and it is expected that adult population in the USA will be about 20% in 2020. Similarly, the adult population in Hong Kong will shoot up to 24% by

2025. The implication is that education for the elderly will be a major issue by 2025 and 2020 in Hong Kong and the USA respectively. Thus, understanding and providing for lifelong education must be an important issue for the twenty-first-century education planners.

Women on distance education programmes are permitted to have children while taking part in their studies. The only expected of them is to accomplish the entire task assigned to them as students. It is, therefore, not surprising to see pregnant women and nursing mothers during face-to-face sessions at learning. The gap here is that we assume some of the things nursing mothers pass through during face-to-face sessions without considering from nursing mothers' perspective what they go through during face-to-face sessions. Therefore, the aim of the researcher is to find out what problems nursing mothers face during face-to-face sessions, and what can be done to enhance the learning atmosphere for themselves and their babies. The purpose of the research is to identify the educational challenges facing nursing mothers on College of Distance Education University of Cape Coast distance education programme in the Upper West Region. It is also to identify strategies and interventions in dealing with nursing mothers to create a healthy learning environment for academic success. The objectives of the study are:

- To seek information on the challenges nursing mother face when they attend face-to-face sessions at the study centres.
- To seek information on how the nursing mothers can be made comfortable during face-to-face sessions at the study centres.
- To add information to the database on the challenges facing nursing mother during face-to-face sessions at the study centres.

The following research questions are set to guide the collection of data to answer the research problem.

- What are the challenges facing nursing mothers during face-to-face sessions?
- What are the solutions to enhance a healthy learning environment for nursing mothers in distance education programs?

The research is significant to the extent that it will reveal the challenges nursing mothers pass through to acquire education. It will also inform susceptible students about the pros and cons of carrying a pregnancy through to delivery and becoming nursing mothers in distance education programme. The findings can serve as a resource document to address the educational needs of pregnant and nursing mothers in distance learning institutions. The study is delimited to nursing mothers in College of Distance Education University of Cape Coast in the Upper West Region of Ghana for proximity reasons (Creswell, 2009). Secondly, the study is delimited to nursing mothers in distance education because they are directly affected and ready to give information that will help to enhance their learning.

Theoretical Framework

Functionalist's theory sees society as a system that is made up of organs and units that perform their functions to maintain society (Fletcher, 2011). We can liken the family as one of the units that handle procreation to sustain society. The moment the family becomes dysfunctional you disallowing marriage to take place, procreation will cease causing a societal dis-equilibrium. Childbirth is a normal activity for all adults in society. Whatever circumstance childbirth occur, whether as a student, a worker, or homemaker is a normal activity. Adult education must not disrupt the order and flow of the family system. What government must do is to adjust to the needs of the adult learner to achieve stability and continuity (Fletcher, 2011). That is why the current study is adopting the functionalist's theory as a framework for supporting and promotes solidarity and stability among students on distance learning programs. The reason is that each student is also doubling as a nursing mother is a function of society and the educational system. While the government makes an effort to integrate all persons in the education sector, it is the responsibilities of the student nursing mothers to take advantage of the situation to education themselves to earn gainful employment.

Methodology

The methodology aspect of a study is very crucial because it provides the reader with information on how the study was conducted. In other words, it gives the reader the opportunity to determine whether the study is valid and reliable (Creswell, 2013). Usually, the section provides a precise and unambiguous description of the methods used to arrive at conclusions. Thus, Paton (2002) explains that it is very crucial to indicate why certain methods were chosen for the study. Case study design was adopted as the best research design for the study. According to Creswell (2009) a case study design is compatible with the description of events in a natural setting. It is also relevant for the study because it focuses on the experiences of the participants in a particular location.

The population comprises of all nursing mothers participating in the University of Cape Coast College of Distance Education program. Specifically, the study took into consideration the nursing mothers at the Wa study centre in the Upper West Region of Ghana. The current total number of nursing mothers in the program is thirty-one (31). Thus, purposive sampling was used to select all the nursing mothers to participate in the study. The objective of the study is not to generalize the results, but to seek particular challenges facing the nursing mothers at the study centre (Patton, 2002). It is difficult to defend the representativeness of a purposively selected sample. However, purposeful sampling is used to ensure that, opinions gathered are a true reflection of the opinions of nursing mothers in the Wa study centre (Dawidowicz, 2010).

The most appropriate data collection instrument for the study is a questionnaire. Questionnaires are useful tools for analyzing opinions; it enabled the researcher to collect and analyze the challenges facing nursing mothers in distance learning programs with specific reference to distance education programs offered by College of Distance Education University of Cape Coast. Some of the advantages of using questionnaires are that they ensure anonymity, and also grant the members the opportunity to attend to the questionnaire at their convenience time (Patton, 2002). The questionnaire carried a total of eight items. The first two questions sought the members' level of study while the second question seeks to find out how old the child is. The researcher assumes that older children are not supposed to be carried to learning centres. All mothers with children above two years are considered as older, and their responses to the questionnaire were not considered in the discussions and conclusions. Fortunately, no response to the question on the age of the baby met the criteria for rejection. Thus, all the thirty-one questionnaires were assumed useful for the study. The remaining six items provided answers to the two main research questions. Two weeks was used to collect data from the members, and the data were collected personally.

Data analyses were primarily descriptive. Each item on the questionnaire is analyzed and explained according to shared views. Data on all items were presented using frequencies and percentages. The idea of using frequencies and percentages is to ensure a better and easy presentation of results for analysis. Data from items 6, 7, and 8 were similar. To avoid duplication of Tables response from the three items were merged and presented in Table 6.

Results and Discussion

The analysis was carried out on all the six items presented to members on the questionnaire. The results presentation and analysis are organized to answer the two research questions set to guide the conduct of the study.

Table 1: Level of Study

Variables	Frequency	%
Level 100	16	53
Level 200	01	03
Level 300	11	37
Level 400	02	07

Level 500	Nil	Nil
Total	**31**	**(100.0%)**

Table 1 shows that most of the nursing mothers (53%) are in level 100. 37% are in level 300 while 03% and 07% are in level 200 and 400 respectively. The implication is that the students came into the program with pregnancies. It could be that they were not sure they will participate in schooling but rather got the admission to access education. Level 300 is a final year level for diploma certificates, and the students probably think they have almost completed and can start family life.

Table 2: Age of Child

Variables	Frequency	%
Less than 2 Years	31	100
Above 2 Years	Nil	00
Total	**31**	**(100.0%)**

All the members' babies were less than two years. Thus, all the questionnaires were useful in to the study and were utilized in the discussions.

Table 3: Summary of Responses on the challenges nursing mothers face during face-to-face sessions at the study centre

Multiple Responses	Frequencies
Feeding child whiles lectures go on	4
Moving out to check on baby and baby sitter	2
No care taker to support nursing mother	1
No baby centre at the study centre	2
Baby cries during lectures making myself /other students uncomfortable	10
Lecture hall very hot for the baby	1
Baby moves around the lecture hall creating distractions	9
Spend lots of money to get a baby sitter	2
Miss first lesson because you have to settle the baby first before lectures	1
Less concentration	10
Stress	1

A quick look at the summary of results on Table 3 shows ten members indicating that their babies cry a lot during lectures making them uncomfortable alongside other students. It is common to hear babies cry during lectures prompting their mothers to leave the lecture scene to attend to them. In some cases, some may not return to the particular lecture. It was in the right direction when the same number of members indicated they have less concentration during lectures. It is difficult to listen to lectures when your baby is crying making you and others in class uncomfortable. It goes to support the issue of how the nursing mothers in distance learning cope for academic excellence (Edwards, Hanson, and Ragatt, 1996). The other significant challenges nursing mothers face during face-to-face sessions include; feeding their babies in lecture halls, or moving out to check on the baby and the babysitter occasionally. The act of checking out on a babysitter is supported by the fact that they lack proper maternalism (Nash, 2010). Thus, mothers do not feel comfortable leaving their babies all alone with babysitters. While some find it a challenge moving in and out to check on baby and babysitter, a member indicated she could not afford for a babysitter. Other challenges are that there are no baby centers and for that matter babies are left to play around while lectures go on. It creates a lot of distractions that sometimes affects the lecture delivery. It is a stressful situation and no mean activity. Perhaps, that is why only one student in level 200 is a nursing mother. Having noticed the experience in level 100, they are not willing to repeat the situation of being a nursing mother.

Table 4: Summary of Responses on the challenges facing nursing mothers during quiz sessions at the study centre

Multiple Responses	Frequencies
There is divided attention and sometimes mistakes set in	4
Children are not allowed inside the examination hall	2
No money to get the support of a baby sitter	1
Spend quizzes time to take care of baby	9
Baby disturbs others in the examination hall	5
Less time to revise by taking care of baby	1
No place to house baby and baby sitter at the study centre	3
Less concentration during to baby's activities	3
Extra time for nursing mothers during examinations	6

The challenges nursing mothers face during quiz sessions are not quite different from the face-to-face sessions. The results are displayed in Table 4. The most challenge facing nursing mothers is having to Spend quizzes time to take care of baby needs. In the process of the examination, some nursing mothers have to leave the examination hall to attend to their babies. It consumes time. However, no added on time is given to them. In line with this fact, the members were quick to ask for extra time during the examination. They also mentioned less concentration due to baby's' activities. Some of the children are toddlers and will want to move around freely, controlling their movement and writing at the same time affects their concentration tremendously. They also mention the situation where babies are not allowed inside the examination room. Meanwhile, there is no baby centre to cater for the babies. At home, they spent less time to revise for examination because the time is shared with taking care of the baby while studying at the same time. Thus, the idea of men taking part in babysitting has to be visited on a more serious note. The belief that it is the sole responsibility of women should be eradicated (Skjortnes & Zachariassen, 2010).

Table 5: Summary of Responses on the challenges facing nursing mothers during examination sessions at the study centre

Multiple Responses	Frequencies
Mother goes to attend to child whiles examination goes on	7
No additional time given to nursing mothers	3
No time to prepare adequately for examination	5
There is lack of concentration	5
Spend a lot of money to seek baby sitter assistance	1
Baby crying causes lots of inconvenience to other	4
No place to house baby and baby sitters	1
Sitting arrangements not favorable sometimes	1
Child refuses to stay with baby sitter or father	1
Extra time for nursing mothers	3
Babies are starved due to the long hours slated for exams	1

Challenges faced during the examination are similar to those of quizzes sessions by the nursing mothers. Two unique challenges were that of starving babies due to the longer time involved in examinations. Usually examination takes up to three hours while quizzes are just thirty minutes. The members also complain of poor sitting arrangements. Where they sit to write examinations give them a lot of inconveniences when they want to move out to cater for their babies. Mother goes to attend to child whiles examination goes on; no additional time given to nursing mothers; and no time to prepare adequately for examination are among the challenges that discussed already under the challenges nursing mothers face during quizzes sessions. In the words of one of the members this is what she wrote "my child always cried whenever I want to write, and will not go to the baby nurse or the father. It is affecting my performance because holding a child with one hand and writing with the other is not easy at

all". It is not only the nursing mothers that are affected in such circumstances. From the data gathered, there is an indication that other students are equally affected. The activities of babies at the study center attract the attention of all students including the course tutors. The situation is reflected on the results of the study when some of the members appeal to colleague students and course tutors to be patient with nursing mothers. There is a crucial indication by the members that when the child is crying during examination you become confused, and cannot even recollect what you studied for the examination. It is very crucial that institutions adjust to the needs of the students who are nursing mothers. It will ensure stability and continuity since adult learning cannot be devoid of nursing mothers and sometimes nursing fathers as well (Fletcher, 2011).

Table 6: Summary of Responses on what can be done to create a better learning environment for the nursing mother during face-to-face, quizzes, and examination sessions

Multiple Responses	Frequencies
Crèche/play ground for nursing mothers babies at the study centre	28
Extra classes for nursing mothers	7
Institution should provide baby sitters at centres	1
Other students and tutors should be patience and understanding	8
Place nursing mothers in a separate room for examinations	8
Give extra time to nursing mothers to complete their teacher made test	31
Lessons start too early	1
Encourage nursing mothers to learn	2
Nursing mothers should be seated in front to enable movement to and fro	1
Nursing mothers should come along with baby sitters	3

In a bit to find out what can be done to make learning a smooth occasion for nursing mothers this is what they have to say: That the institution must give extra time to nursing mothers to complete their teacher made test, quizzes, and examination as well. The request for an extra time comes from the fact that they spend part of the examination time to nurse their babies. It is a call in the right direction and just as Fletcher (2011) said it is important we maintain a balance in society because procreation is as good as education. They also advocated for a Crèche or playground for nursing mothers babies at the study centre. It is also a good suggestion because professional care for babies will ease the minds of nursing mothers and grant them the maximum attention they need during examination and face-to-face sessions.

Other suggestions include place nursing mothers in a separate room for examinations. They also called on other students and tutors to be patience and understanding. The call comes in connection with how other students get irritated with the distractions babies caused during face-to-face sessions and examinations. According to the nursing mothers, lessons start rather too early. They need to prepare and cater for their babies before they can report to the study center. Thus, when lessons start too early, they find it difficult participating in first lectures of the day.

Conclusion

The objective of the study is to seek information on the challenges nursing mother face when they attend face-to-face sessions at the study centres. It was also aimed at seeking information on how nursing mothers can be made comfortable during face-to-face sessions at the study centres. The results have indications to prove that nursing mothers have numerous challenges during face-to-face sessions. There are other peculiar challenges they face during other activities at the learning centres such as the end of semester examinations, quizzes, and assignments. A quick glance at the results shows that the biggest challenges nursing mothers face at the study center in Wa are spending lecture periods to nurse babies, and also lack baby centers to accommodate babies while mothers attend lectures. The others are spending examination time to attend to babies and lack of resources to hire babysitters. The following

solutions can be adopted from the suggestions they made: Extra time to write examination and quizzes, and a separate room for nursing mothers during examinations. The others are a baby center to accommodate babies, and tolerance towards babies and their mothers during face-to-face sessions as well as during examination and quizzes. When these solutions are implemented, it will enhance a healthy learning environment for nursing mothers in distance education programs.

Recommendations

The researcher recommends a study of how the activities of nursing mothers affect other students at the learning centre.

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References

[1] Aiston, S. J. (2011). Equality, Justice and Gender: Barriers to the Ethical University for Women. Ethics & Education, 6(3), 279-291. doi: 10.1080/17449642.2011.632721.

[2] Amina, J. A. (2015). Challenges Faced by Girls who Dropout from Senior High School: the Voices of Sixty Dropout Girls in the Upper West Region of Ghana. *International Journal of Humanities and Social Science, 5*(6,1), pp. 150-160. http://www.ijhssnet.com/journals/Vol 5 No 6 1 June 2015/17.pdf

[3] Boulton-Lewis, G. M. (2010).Education and learning for the elderly: why, how, what. *Educational Gerontology, 36*(3), pp. 213-228. Retrieved October 14, 2015, from http://eprints.qut.edu.au/38277/

[4] Creswell, J. (2009). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (Laureate Education, Inc., custom ed.). Thousand Oaks, CA: Sage Publications.

[5] Creswell, J. W. (2013). Qualitative inquiry and research design: Choosing among five approaches (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

[6] Dawidowicz, P. (2010). Literature Reviews Made Easy: A Quick Guide to Success. Charlotte NC: Information Age Publishing.

[7] Dhillon, J., McGowan, M., and Wang, H. (2015). What do we mean by student support? Staff and students' perspectives of the provision and effectiveness of support for students. Retrieved September 3, 2015, from http://core.ac.uk/download/pdf/1931769.pdf

[8] Edwards, R., Hanson, A., & Ragatt, P. (1996). Boundaries of Adult Learning. British Journal of Educational Studies, 44 (4), pp. 465-465. Doi: 102307/3121928

[9] Fletcher, R. (2011). Functionalism as a Social Theory. *The Sociological Review, 4*(1). doi: 10.1111/j.1467-954X.1956.tb00976.x

[10] Fowler, F. J. (1984). *Survey research methods*. Thousand Oaks, CA: Sage.

[11] Goldin, C., and Katz, L. F. (2008). "Transitions: Career and Family Life Cycles of the Educational Elite." *American Economic Review, 98*(2), pp. 363-69. doi: 10.1257/aer.98.2.363

[12] Gonzalez-Mena, J. (2010, July 20). The Media as an Influence on Socialization. Retrieved October 15, 2015, from http://www.education.com/reference/article/media-as-influence-socialization/

[13] Ministry of Education. (2013). Ghana Education Reform 2007. Retrieved August, 29 2014, from, http://ghana.peacefmonline.com/ghana/ministries/moeducation/

[14] Nash, I. (2010). Babysitter: An American History (review). *The Journal of the History of Childhood and Youth, 3*(2), pp. 301-303. Retrieved September 2, 2015, from http://muse.jhu.edu/journals/hcy/summary/v003/3.2.nash.html

[15] Patton, M. Q. (2002). *Qualitative research and evaluation methods.* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

[16] Skjortnes, M., & Zachariassen, H. H. (2010). 'Even with higher education you remain a woman': a gender perspective on higher education and social change in the Toliara region of Madagascar. Gender & Education, 22 (2), p193-207. Retrieved from http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=9&sid=779719b4-d87c-4550-89f7-164306d805c0%40sessionmgr113&hid=114

[17] Tomlin, C. R. (2008). Factors Affecting Socialization of Children. The Professional Resource for Parents and Teachers. Retrieved October 15, 2015, from http://www.earlychildhoodnews.com/earlychildhood/article_view.aspx?ArticleID=553

[18] Tyack, D. & Cuban, L. (1995). *Tinkering Toward Utopia: A Century of Public School Reform*. Cambridge: Harvard University Press.

[19] United States Office of Personnel Management. (2013, January). Guide for Establishing a Federal Nursing Mother's Program. Retrieved September 3, 2015, from https://www.opm.gov/policy-data oversight/worklife/reference-materials/nursing-mother-guide.pdf

Challenges Faced by Leaders of Institutions of Higher Learning in Uganda: Case Study of Mbale Public and Private Universities

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Introduction

After spending 30 years in the education sector, I have realized that there are issues that most of the time cause schools to not operate or function as planned. Each school has its own vision and mission, goal and for well-organized schools strategic plans to attain those goals are developed. Issues arise frequently during the implementation phase of strategic plans. These issues are many and vary with schools. Some are caused by people involved in the education and others are related to situations that sometimes those people can or cannot control.

Education is facing many issues in the world today and following are the top ten issues that need to be considered. According to DeWitt (2014)**,** there are 10 critical issues that need to be examined. These include Common Core Standards, Student learning, technology, social media, politics, high stakes tests, school leadership, pre-service teaching programmes, school climate and poverty. All these are crucial to the field of education and need to be critically looked at in order to gauge education systems and find a way to address those issues and find a way to solve each one of them for the betterment of the education system.

From the courses, I have studied; technology is at the center of every subject matter. Technology advancement has affected teaching and learning and classes have moved from traditional ways of teaching to modern ways of transmission and acquisition of knowledge. Teachers worldwide are moving from blackboard to whiteboard, from chalks to whiteboard markers. Most teaching is using multiple devices in order to facilitate teaching and learning. The use of whiteboards and whiteboard markers combined with a computer and a projector. Others use mobile phones, Kindles and IPods, the internet, etc.

The other change in the teaching system is the move from classroom teaching to E-learning. The se of both computer and the internet has enabled to move from a physical presence to the online learning using electronic devices. This move has its own challenges. As much as technology is needed, there is also the fact that leaders must have financial ability.

In fact, technology has changed education methods and is becoming a big problem for those schools that cannot afford buying all those devices that are needed for quality education during this 21st century. The reality is that there is a gap between the poor and the rich and this brings in the dimension of economics and social statuses as far as education is concerned. There is a lot of effort to develop Core Common States Standards in the US in order to improve education. However these standards do not come without challenges. The authors stress the advantage of the integration of Common Core State Standards (CCSS) and 21st century skills in the curriculum (Alismail& McGuire, 2015). They point out that the benefit is not only for students and teachers but also the integration enables students to be well prepared for their future careers. There is also emphasis on the necessity to help students be more creative and use the power of technology to use their skills in a very special way and this later on in the future. Through creative thinking, students can retain knowledge and also produce evident outcomes.

Also it is worth to note that Hanna (2003) says that, “Higher education institutions around the world face the growing problem of relevance as they enter the 21st century.” The aspect of relevance, the content of curricula must be relevant to current trends in politics, economics, society, culture and all other domains of life. This without doubt will enable student-teacher interactions that meet the expectations of the 21st century.

A part from technology and relevance of curricula, another critical issue is the gap between Student learning and teaching. Lisa Nielsen cited by DeWitt (2014) points out that, “Student learning is everything from different pathways to graduation, encouraging student voice in student learning, and

encouraging them have a place at the table for larger conversations about their education." In fact, in most traditional methods, the focus has been often putting attention on teaching rather than focusing both teaching and learning. This is another problem. Education should have learners at its center for more effectiveness.

Politics also is another area that has both positive and negative impact on education. There seems to be conflict of interest between the government and leaders of Institutions of higher Learning. On one hand, most governments have educational philosophies to suit their agenda. In order to realize this, they establish public schools but sometimes the government does not address all educational needs of its population. On the other hand, private organizations and individuals come to the rescue of the population by establishing alternative schools as a solution. Most of the time, when private institutions establish schools, they construct and import in learning equipment. Sometimes taxation is imposed on them which may cripple financially educational institutions. Besides taxation, any misunderstanding between the ruling party and opposition parties also affects the day-to-day operation of educational institutions.

Social Media also is a challenge. As much as social media is needed for people to network, it is also a tool that can be used for education this can be quite challenging since it can also be a tool that can distract learners. In relation to this Baran (2001) speaks about the double edge of technology. Social media is a new way to communicate and could be used for both good and bad in the education system. Texila University encourages its students to use this platform so that both Students and Professors can use it for very fast communication (Skype, WhatsApp, Emails, etc.). In relation to this, William (2012) indicates,

> The online presence for many schools has moved beyond the school website. It now includes a Facebook page(www.facebook.com), a Twitter account (www.twitter.com), blogs by teachers, principals or the superintendent, and YouTube (www.youtube.com)and Flicker (www.flickr.com) for sharing videos and photos about school.(www.educationpartnerships.org).

School leadership style can also be a source of challenge for the leader especially when the leader does not realize how his or her style is affecting his followers or when he does not consider the school climate. Hughes *et al* (2015) points out that, "good leadership…involves touching other's feelings; emotions play an important role in leadership too. Pre-service teaching programme is also another area of teaching that can hinder or improve the quality of education. Those who undergo this programme are well prepared to face leadership challenges when they happen. School climate is another issue that can hinder or boost education efforts. In line with this, Zakrzewski (2013) says,

> If you're a school leader, you have problems to solve: bullying, teacher burnout, disengaged students, casual vandalism and litter, and cultural and socio-economic differences, among others. Researchers have found that a positive school climate can help solve a lot of those problems. Studies find that it decreases absenteeism, suspensions, substance abuse, and bullying, and increases students' academic achievement, motivation to learn, and psychological well-being. It can even mitigate the negative effects of self-criticism and socioeconomic status on academic success. In addition, working in this kind of climate lessens teacher burnout while increasing retention.

In Africa, among other challenges, there is also lack of willingness to face challenges. University World News (2013) points out that,

> There appears to be growing willingness in Africa to provide better oversight to higher education institutions. But academics, including vice-chancellors, are "not taking up the challenge to domesticate and harness the spaces they are given". This was one of the lessons learned at a convening of higher education leaders and researchers from across the continent.

Does this have a connection with colonial legacies? Cut right (2010) points out that the colonial legacies for higher education in Uganda are similar to those in other colonial settings in sub-Saharan Africa, whether British or not. The higher education sectors were substantially underdeveloped, intentionally kept small, and open to a very small percentage of the population. This is the time to

think big and change traditional ways of educating and we must face demands and expectations of this century.

Research Problem

This project proposes to evaluate areas of leadership that hinder the smooth running of institutions of higher learning and find out possible solutions that can aid leaders of institutions of higher learning alleviate regular challenges that affect their leadership.

Hypothesis

A hypothesis is an anticipated solution or response to an existing problem or challenge. According to the dictionary, a hypothesis is a proposition, or set of propositions, set forth as an explanation for the occurrence of some specified group of phenomena, either asserted merely as a provisional conjecture to guide investigation (working hypothesis) or accepted as highly probable in the light of established facts ((http://dictionary.reference.com/browse/hypothesis).For the sake of this project, the following hypothesis was formulated is: The challenges Leader of Institutions of Higher Learning in Uganda face depends on the leadership styles in practice."

Leadership Theories

In order to address challenges, it is worth to understand existing leadership theories and styles that will give a broad picture of what leadership is. Different leadership theories have been developed since. A theory provides an explanatory framework for some observation and from the assumptions of the explanation follows a number of possible hypotheses that can be tested in order to provide support for, or challenge, the theory (https://en.wikipedia.org/wiki/Theory).

For this capstone project, it was found useful to enumerate some leadership theories and these include: Great Man Theory, Trait Theory, Behavioral Theories, Role Theory, Participative Leadership, Lewin's leadership styles, Situational Leadership, Hersey and Blanchard's Situational Leadership, Contingency Theories, Transactional Leadership, Transformational Leadership. Many other leadership theories and styles do exist and will be focused on more latter at dissertation phase.

Objectives of the project

1.5.1 Identify challenges faced by leaders in Institutions of Higher Learning in Uganda
1.5.2 Determine their causes
1.5.3 Propose ways to overcome them.

Scope of the project

This project was conducted during the months of May and June 2015 in Mbale District, Republic of Uganda. It was limited to Educational Professionals who have more than 10 years of teaching experience and who have also held leadership positions. The focus of the project is educational leadership and related challenges.

Related Literature Review

In his book on Practical Research, Leedy, P. (1992)indicates that, the nature of research is academically global. Research leads the investigator into new and unfamiliar territory that must comprise a part of the journey in pursuit of the resolution of a specific problem and of the advancement of knowledge. It is for this reason that this project has been undertaken. It is worth to look into issues and or challenges that affect Institutions of Higher Learning and especially leadership. The approach is therefore to check into what educational scholars

Challenges of leadership development are a reality in institutions of Higher Education globally. In United States of America, Hill (2005) points out that developing leaders is an especially daunting task for higher education institutions. Like individuals working in professional service firms, academics are often ambivalent about assuming leadership roles. Their professional identity and sense of satisfaction from work are derived principally from their professional expertise and accomplishments. They are not recruited for their leadership potential, but rather are selected and rewarded for their research, course development and or teaching.

Those leading institutions of higher education need leadership training in order to prepare them to address issues and or challenges that can happen in the course of their work especially when assuming leadership roles in academia. In line with this, Hill believes that there is a crisis in leadership in many sectors of society today and Higher Education is not immune to these concerns. There is need to build communities of leader-scholars, willing and able to learn and tackle together the challenges of contemporary academic life (Op. cit.).

Different other authors have written a lot on the challenges that leaders face in Institutions of Higher learning. In Europe, Trivella, Ipsilantis, Papadopoulos, and Kantas (2012) wrote the article 'Challenges for Quality Management in Higher Education – Investigating Institutional Leadership, Culture and Performance. 'This article shows that quality remains a critical issue in Institutions of higher learning and must be ensured.

The EAIE BAROMETER did its first study to map international Higher Education, there appears to be growing willingness in Africa to provide better oversight to higher education institutions. But academics, including vice-chancellors, are "not taking up the challenge to domesticate and harness the spaces they are given". This was one of the lessons learned at a convening of higher education leaders and researchers from across the continent (EAIE Barometer, 2013). This calls for opportunity grasping. In Uganda, this was also echoed in a meeting with the 44thVice Chancellor's Forum held at Makerere University. Higher education leaders were advised to be proactive in addressing challenges (UVCF, June 2015).

In the introduction section, we spoke about ten issues affecting leaders in education system. One of these addressed technology. In fact, Sife, Lwoga, and Sanga discuss the challenge related to the integration of technologies in higher learning with examples from Tanzania, and give at the same time best approaches for addressing each one of them Sife, *et al* (2007).Another challenge has to do with funding. Professor Okebukola (2008) points out another important challenge, the lack of adequate funding. Ogunruku (20012) presented a paper in Vice Chancellors' Forum. His interest was on "leadership and Governance in Higher Education-Challenges and Prospects of developing the Next Generation of University leaders, academics and researchers, the Management levels."

Here and there scholars are showing interest in tackling or addressing the challenges that Leaders of Institutions of Higher Learning face. It is for this interest, that this Capstone Project has been developed. For them to be able to address these challenges, it is must that these challenges be identified up to the root.

Methodology

Kothari (2012) writing on research methodology stresses that, "Some people consider research as a movement, a movement from the known to the unknown. It is actually a voyage of discovery." He further states that, "Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them."

It is in this perspective that this project is written. In fact, the purpose as indicated earlier was to find out challenges that leaders of Institutions of Higher Learning face. To realize that purpose, a descriptive survey was conducted. Thus, the project was done with the effort of respecting the rules of scientific inquiry.

Population, Sample size, Inclusion criteria

This survey had as population 15 lecturers and leaders in institutions of Higher Learning and the sampling technique was purposive. For each individual of the population of the study, the inclusive criteria were: first, to be an active educational professional in one of the accredited Institutions of higher learning in Mbale District (Republic of Uganda); second, the individual should have been in service for a period of at least 10 years. There was no gender discrimination.

Data Collection Technique

To collect data a questionnaire was used with open-ended questions and for the sake of verification this questionnaire is provided in Appendix 1.

Presentation of Findings

The population that was targeted for this project was 15 individuals. For the sake of reliability, our findings are data collected from only those individuals who actually accepted to fill and returned the questionnaire on time. Below are the findings per question:

1 Could you please enumerate the challenges affecting Institutions of Higher Learning in Uganda?

Challenges:

- 1.1 Poor Policy implementation approaches
- 1.2 Wrong people doing the right job
- 1.3 Poor leadership: e.g. lack of efficient leaders
- 1.4 Shortage of qualified staff
- 1.5 Limited land (space challenges)
- 1.6 Administrative challenges leading to strikes
- 1.7 Under funding for government institutions and the little fund allocated come late
- 1.8 Theoretical courses are taught. Little or no value added for job market
- 1.9 The education system at both primary and secondary make students very lazy and not creative
- 1.10 Poor remuneration
- 1.11 Absenteeism of both students and lecturers
- 1.12 Syllabi not completed on time
- 1.13 Use of mobile phones disturbs classes
- 1.14 Students unable to pay tuition fees
- 1.15 URA Taxation to Private Institutions
- 1.16 Training students to seek of jobs instead of enabling them be job creators
- 1.17 High cost of lab equipment
- 1.18 Peer pressure from friends and parents in course selection
- 1.19 Sex for marks in some universities (Though at small scale)
- 1.20 Big ratio of learners to instructors in public universities
- 1.21 Moral decay/ethical dilemmas
- 1.22 Education technology not adequate
- 1.23 Lack of systematic mentoring
- 1.24 Staff development is hard to accomplish and expensive
- 1.25 Corruption

2 Do you think that leaders of Institutions of Higher Learning face specific challenges? If yes, list them.

- 2.1 Pressure from students and stakeholders
- 2.2 Competition
- 2.3 Bandwagon among leader
- 2.4 Budgeting challenges
- 2.5 Developing curriculum/lack of innovations
- 2.6 Enforcing new technologies to arts students
- 2.7 Regulations and disciplinary actions
- 2.8 Failure to meet education for all
- 2.9 Social responsibilities
- 2.10 Leadership Crises between students and administration
- 2.11 Assessment of a number of issues
- 2.12 Shortage of administrative skills, leading to strike
- 2.13 Inability to create and maintain teams
- 2.14 Short of lobbying skills
- 2.15 Inefficient facilitation

2.16 Large classes especially in public Universities
2.17 Education politics as a result of competition among the institutions
2.18 Many students demands
2.19 The responsibility of managing workers from different disciplines
2.20 Little support for research activities
2.21 Over dependence on tuition paid by students
2.22 Disagreements among leaders and this hinder progress
2.23 Low technology integration in teaching and learning
2.24 Pressure from politicians
2.25 Students scholarships not equally distributed in the country (Income differences)
2.26 Students indiscipline especially from Public Institutions
2.27 Managing students from rich families who have more money than the salaries of lecturers
2.28 Role conflicts
2.29 Managing Multicultural students and staff
2.30 Lack of guidance and counseling of staff

3 According to you, what are the most crucial challenges of these leaders that need to be addressed with urgency and indicate why?

Yes

3.1 Develop ethical values
3.2 Develop strategies for implementation
3.3 Handling social issues especially relationships
3.4 Quality Assurance to meet required standards
3.5 Code of conduct
3.6 Regulating disciplinary actions
3.7 Full time presence at the institution
3.8 Shortage of administrative skills
3.9 Lack of sensitivity to the needs of subordinates
3.10 Lobbying skills needs to be urgently addressed. Because it lacks has caused Institutions to go into financial deficit
3.11 Offering good administration to the Institutions
3.12 Facilities and infrastructure because most of the time
3.13 Students number outweighs schools infrastructure
3.14 Research funding so that teaching staff can be more active in knowledge creation
3.15 Ending strikes
3.16 Changing management styles because the world is also changing fast
3.17 Resistance to change e.g. parents
3.18 Involvement of critical stakeholders
3.19 Lack of ongoing professional building
3.20 Accreditation of programmes by National Council for Higher Education

4 What solutions do you propose in order to alleviate each one of the challenges you have listed so that Uganda can develop more?

4.1 Job should match qualification
4.2 Suppress bandwagon mentality
4.3 Growth and development come in stages hence be slow but sure
4.4 Enforcing regulations and disciplinary actions
4.5 Recognition of students' leadership
4.6 Recruit more staff
4.7 Quality office prioritize the needs
4.8 Security enforcement
4.9 Organize refresher courses in Administration to deal the ever changing behavior of learners
4.10 Sufficient funding from the education agency to provide timely service
4.11 Need to offer additional administrative courses for administrative staff
4.12 Research fund

4.13 Organize income generating projects
4.14 Promote Universities collaborations with foreign Institution to enhance staff development
4.15 Pay well lecturers
4.16 Not allow mobile phones during class sessions
4.17 Family planning and offer financial literacy
4.18 Campaign for tax reduction for private institutions
4.19 Offer career days in most schools so that students choose courses according to employability
4.20 Exempt tax for science equipment
4.21 Counseling to students and parents to stop pressure to students who want to choose their courses
4.22 Proper planning is needed
4.23 Power rotation/Term system

Discussions

This survey has described challenges faced by leaders of Institutions of Higher learning. Although the survey was done in a short period of time, the outcomes have shown that challenges really do exist and there is an urgent need to address them in order to better the education system in Mbale. In fact, what respondents have mentioned as challenges has been also addressed elsewhere. Hill (2005) says that some people are given position without being trained for this role. 90 % of Respondents pointed out the need of proper training for effective leadership. However the findings have indicated challenges of different types that affect more than one sector. This corroborates the writings of Hanna (2003) who says that, "Higher education institutions around the world face the growing problem of relevance as they enter the 21st century." The aspect of relevance, the content of curricula must be relevant to current trends in politics, economics, society, culture and all other domains of life." Unfortunately, in reality this is not true in Mbale. It is therefore crucial and indispensable to improve the situation in Mbale and make sure that the aspect of relevance complies with current trends in politics, economy, culture, and other domains of life. Thus, a thorough research is needed whose results could lead to a rich source of strategies to alleviate discovered challenges.

Summary, Conclusion and Recommendation

Summary

Looking at chapter 4 above, it is obvious that Institutions of Higher Learning do face a lot of challenges. Participants have poured out their minds to express all that they have experienced throughout their many years of service as professional lecturers and leaders in Ugandan Education systems. Apart from answers to questions, they also have shared face-to-face about what needs to be done in order to improve work in the education sector. So it is true that critical issues and or challenges must be addressed if the education system needs to improve and actually actions should target primary, secondary, and higher education (Universities, colleges as well as other Institutions of tertiary level). However, it is important to indicate that the focus for this project was on Institutions of Higher learning in Mbale District (Republic of Uganda).

Conclusion

Institutions of higher Education globally, regionally, and local levels face challenges that affect different aspects of the education system. The list of challenges as the survey has shown challenges at all levels of the teaching-learning process. Some challenges have to do with Pedagogy and Curriculum Development, Administration and Management, Educational Equipment, Leadership and Budget, Technology and Quality, Ethics and Human Resources Management. Participants have shown their concerns that need to be critically looked at and then develop ways to overcome those challenges. They actually proposed different measures that could help address them in order to better the education system. It was great to see how these challenges can be overcome using insights gained from the three courses that we have gone through during this initial part of my first academic year

(Advanced Educational Technology, Curriculum Studies and Teachers' Education as well as Educational Leadership and Management).

Recommendation

For this project, the purpose was to identify main challenges that educational professionals experience here in Uganda. After reading extensively, literature has shown that challenges remain realities here in Uganda, Africa and beyond. It is therefore very useful to find a way to address them and enable professionals to overcome them for the betterment of the education system in Uganda in general and Mbale in particular. From this project, there is a need to organize workshops to address systematically these challenges. The workshops should be well planned and through them establish priorities. After defining priorities, related strategies should be set and implemented and these will vary with the aspects of education that are seriously affected.

Further Research

Following this project, a further and systematic research that will use both qualitative and quantitative methods be done especially in the area of leadership and policy in order to explore the extent to which they are involved in the occurrence of challenges in the education sector and hopefully through this suggest appropriate remedies.

The student has a passion for Educational Leadership and would like to address these challenges through his dissertation later on when he is allow to his research.

References

[1.] DeWitt, P. (2014).10 Critical Issues Facing Education. Retrieved from http://blogs.edweek.org/edweek/finding_common_ground/2014/01/10_crit ical_issues_facing_education.html

[2.] Alismail, H.A. & McGuire, P. (2015).'21st Century Standards and Curriculum: Current Research and practice,' Journal of Education and Practice, Vol. 6, No. 6, p150

[3.] Hanna, D, L. (2003) Building a Leadership Vision: Eleven Strategic challenges for Higher Education. Educause. Retrievedhttp://www.educause.edu/ero/article/

[4.] Baran, S.J (2012). Introduction to Mass Communication.

[5.] Williamson, R. (2012). Research into practice. Education partnerships Inc., Retrieved fromhttp://www.educationpartnerships.org

[6.] Hughes, *et al* (2015). Leadership: Enhancing the Lessons of Experience. 8th Ed. Singapore: McGraw-Hill International

[7.] Zakrzewski, V. (2013) How to Create a Positive School Climate. Retrieved from htto://greatergood.berkeley.edu/article/item/how to create a positive school climate.

[8.] University World News (2013). Lessons and challenges for higher education in Africa 31 August 2013 Issue No:285. Retrieved from http://www.universityworldnews.com/

[9.] Cutright, M. (2010). Expanding Access and Quality in Uganda: The Challenges of Building a Plane While Flying It, University of North Texas, Volume 40, Issue 1 Fall 2010

[10.] https://en.wikipedia.org/wiki/Theory

[11.] https://www.google.com/?gws_rd=ssl#q=leadership+theories+and+styles

[12.] http://www.leadership-central.com/leadership-theories.html#axzz3e0iMYPXD

[13.] http://dictionary.reference.com/browse/hypothesis).

[14.] Leedy, P. D (1992), Practical Research: planning and designing. 5th Ed. USA: Prentice Hall.

[15.] Hill, L. (2005) Leadership Development: A strategic Imperative for Higher Education. Retrieved from https://net.educause.edu/ir/library/pdf/ffp0506s.pdf

[16.] Trivella, *et al.*(2012) Challenges for Quality Management in Higher Education Investigating Institutional Leadership, Culture and Performance. Retrieved from www.intechopen.com

[17.] EAIE Barometer (2013). Lessons and challenges for higher education in Africa 31 August 2013 Issue No: 285

[18.] UVCF (2015). Challenges in Institutions of Higher Learning (44th Forum).

[19.] Sife, A.S.,Lwoga, E.T &Sanga, C.(2007). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries in International Journal of Education and Development using Information and Communication Technology(IJEDICT), 2007, Vol. 3, Issue 2, pp. 57-67.
[20.] Trust Africa (2012). The future and relevance of National Universities and other tertiary institutions, Nigeria: Abuja.
[21.] Kothari. C.R. (2004). Research Methodology: Methods and techniques. 2nd Rev. Ed. New Delhi: New Age International Publishers (P)

The role of guidance and counseling in promoting student discipline in secondary schools in Kenya: A case study of Kisumu district

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Source

Jack O. Ajowi and Enose M. W. Simatwa, 'The role of guidance and counseling in promoting student discipline in secondary schools in Kenya: A case study of Kisumu district', Education Research and Reviews, Vol. 5 (5), pp. 263-272, May, 2010, http://www.academicjournals.org/article/article1379608450_Ajowi%20and%20Simatwa.pdf

Introduction

This is the review which critiques on the article 'The role of guidance and counseling in promoting student discipline in secondary schools in Kenya: A case study of Kisumu district' which was published in the Journal "Education Research and Reviews", "Vol. 5 (5), pp. 263-272, May, 2010". During the review it will include the summary of this article. It 'll also depict the structure analysis by giving the feedback on it that how well it has been written with respect to the understanding and readability of the reader. There will be the analysis on the way of elaborating that how well it is providing the information that has been used in it. The review will also contain the critique on the article along with evaluating the authority, its currency, accuracy, objectivity and coverage as well.

Review of Literature

Article Summary

The article is providing the analysis on guidance and counseling services, activities, attitudes and relationships so that as much as possible, each pupil's basic psychological needs which are satisfied through the medium of education. It mentions five basic questions on which the whole research depends and concludes.

Article Structure

The article contains the proper structure which is very intuitive for the reader. It starts with an introduction which gives a proper idea about the article to the reader even before reading the full article and the reader can judge whether the article is of interest or not. It includes very distinct sections and provides proper references. It contains a tree like structure with proper headings and helping reader to directly move to the section of interest. References section contains the clear references in text.

Article Critique

Authority

The article was published in the journal "Education Research and Reviews", "Vol. 5 (5), pp. 263-272, May, 2010" is a peer reviewed open access journal. It is published twice monthly and also covers all areas of the subjects such as comparative education, early childhood education, adult education, special education, teacher's training, vocation education, educational technology, educational administration and management, curriculum development, education policies and management etc.

The authors have to met the requirements of the editorial policy and publication ethics then the the article can be published in this journal. This makes it very credible source for the articles and hence adding the worth to the published articles.

Accuracy

The accuracy of this article can be seen in the sources of information mentioned in the article and making it very authentic. It provides very comprehensive information to making its accuracy more clear. All the information provided contains the proper references too, as increasing the accuracy.

Currency

The journal issue containing the article was published in 2010, while the article was accepted for publishing in March 16, 2010. It shows that the research is current and article cites up-to-date references.

Relevance

The journal in which this article was published contains the academic context. It is concerned with promoting the guidance and counseling hence is highly related to nursing.

Objectivity

The article contains the information which depicts the research and has been objectively directed. The authors have good research work and their expertise adding more insight for the readers. The findings show that guidance and counseling has not been effectively used to promote student discipline. This was evidenced in the disciplinary cases that were found in the schools. According to this research article, the understanding about the importance of the guidance and counseling is of worth. It could be more influencing if it could have some statistical background and references too. Otherwise, it shows the strength of this research.

Stability

The article was published in a journal which contains very stable data so making itself a stable source.

Analysis of graph/Image/Table

(Not Applicable)

Conclusion

This review critiques and also provides the summary of the article very intuitively. According to this article certain administrative tools such as effective supervision, effective leadership and effective communication are vital tools in ensuring the role of guidance and counseling in promoting student discipline.

Assistance and compensation to victims of trafficking

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Abstract

According to international norm, the Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power, adopted by the General Assembly of the UN, is the international act fundamental, defining the rights of victims and procedures for compensation for damage to them. This paper promotes some of their rights to move up to the justice and fair treatment to them that among other things means legal assistance and information in time for all aspects of procedural, restitution, compensation of damage, putting in place rights, etc., the compensation from the state when the offender funds are insufficient for this etc.

Besides compensation from the trafficker, there is another way to compensate the victim, through a public scheme. In our domestic legislation that provided for in Law no. 10192, dated 3.12.2009 "On prevention and suppression of organized crime and trafficking through preventive measures against assets".

Through the work of this analysis will be addressed through legislation compensation, indemnification and above all contributions awarded to victims of human trafficking:

Keywords*: relief, damages, legislation, compensation, trafficking of human beings*

Protection and assistance to victims of trafficking

Similarly, the Convention of the United Nations Convention against Transnational Organized Crime and its additional Protocol, the so-called Palermo Protocol to prevent, suppress and punish trafficking in persons, especially women and children, stipulate the obligation of States Parties, which depending national law, enable the views and concerns of victims to be present and to be considered at appropriate stages of the investigation procedures[2]. Article 6, paragraph 2 of the Protocol, establishes the obligation of states to provide assistance to victims of trafficking through such measures that provide victims of trafficking in appropriate cases, information about court proceedings, assistance in order to present concerns and problems and the steps to be taken into account relevant criminal proceedings against offenders, without prejudice to the right of defense[3].

Meanwhile, the Council of Europe Convention "On Measures against Trafficking in Human Beings" in 2005 compared to other international instruments in the fight against trafficking in human beings has at its center the human rights and protection of victims. The Convention defines trafficking as a violation of human rights and violation of human dignity and human integrity.

Regarding the scope of the Convention, it covers all forms of trafficking, whether national or across borders, linked or not to organized crime, all victims of trafficking (women, men and children), all forms exploitation (sexual, forced labor or services, slavery, the removal of organs). This Convention is the first international legal instrument that gives the definition of "victim of trafficking in human beings'.

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[1] Tirana, Albanai, Prosecution of Serious Crimes-Tirana,

[2] Law no. 8920, dated 11.7.2002, "On the ratification of the UN Convention against Transnational Organized Crime and its two additional protocols", paragraph 3 of Article 25 "Support and protection of victims' Convention

[3] Law no. 8920, dated 11.7.2002 "On the ratification of the UN Convention against Transnational Organized Crime and its two additional protocols", paragraph 2, Article 6 "Assistance for the protection of victims of trafficking in persons"

Under Article 28 of the EC Convention victim should be guaranteed the right to be protected from potential retaliation or intimidation, in particular during and after investigation and prosecution of traffickers. That's right, if necessary, applies to those who report criminal offenses of trafficking in persons or to cooperate with authorities in the investigation or criminal proceedings, as well as witnesses to give evidence and, if necessary, members of their family. Protection may include physical protection, relocation, identity change and assistance in finding a job. Concerning children, section defines special protective measures in the best interest of the child.

The situation is different in the Albanian criminal legislation. Our system is an accusatory system, so there are in the spotlight of the offender and the sole purpose of criminal sanctions are the author's detention, prevention of commission of criminal offenses by others, and the rehabilitation of the author through the penitentiary system. While the restitution and compensation of victims does not constitute in itself the purpose of the criminal sanction[4]. Albanian Criminal Code in its general part does not recognize the term "victim" as this part focuses mainly on general concepts of crime, criminal liability and criminal sanctions, while the Code special deals with specific offenses. T his means that the victim does not appear as a separate entity, independent of the criminal law, as such it does not have standing as a party in criminal proceedings as the prosecution, the defendant and the court.

While the Code of Criminal Procedure mention the term "person aggrieved".[5], through which the injured party is known as the subject procedural figures offense and defective material from the offense, which among them are not provided trafficking offenses, Article 110 /a "Trafficking of adults" and Article 128 /b "Trafficking minors ", thereby excluding the right of trafficking victims to legitimize the subject of separate proceedings. For these reasons nowadays under criminal procedural victims of trafficking are not directly involved in the criminal process as a party "cannot achieve its fundamental rights to participation, protection and restitution".[6].

As part of the continuing review of domestic legislation to bring it in line with international norms mentioned above, in May 2013 Criminal Code underwent some changes, which aimed at harmonizing the provisions of the Code on offenses of trafficking in human beings Convention obligations EC. Specifically, regarding the provision on non-punishment of trafficking victims, the new Article 52 / a "Exemption or reduction of sentences for collaborators of justice and victims" of the Criminal Code[7] It establishes the possibility of exemption from serving the sentence or reduce its victims of trafficking if charges and helps makes legal prosecution of the offense of trafficking in persons. Although the introduction of Article 52 / a of the Criminal Code can be considered a positive step in the protection of victims of trafficking, again, this article is only partially compliant with the standard required by the Convention, since it connects the exemption from punishment of the victim by giving charges or collaborating with justice. From the interviews conducted by prosecutors it shows that in cases where the victim refuses to provide narration or statement about her trafficking or exploitation, initiated criminal proceedings dismissed and when they are used for prostitution in the event of non-testifying prosecute prosecuted for prostitution.[8]

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[4] Sander Simon "The treatment of trafficking victims as witnesses during the trial. Legal options for compensation of victims of trafficking and the need for legal changes. Problems encountered in judicial practice. "Tirana, February 2013

[5] Law No. 7895, dated 27.1.1995 "Criminal Code of the Republic of Albania", as amended, Article 58 "The rights of the victim of crime" and Article 59 "The injured accuser"

[6] Sander Simon "The treatment of trafficking victims as witnesses during the trial. Legal options for compensation of victims of trafficking and the need for legal changes. Problems encountered in judicial practice. "Tirana, February 2013

[7] Penal Code, Article 52 / or adding to the law 144/2013, dated 05/02/2013, Article 7

[8] Criminal Code, Article 113 "Prostitution"

Regarding the impact of prevention and other crimes that facilitate trafficking in the new article 110/b of the Criminal Code[9] re provision of benefits or use of services provided by victims of trafficking with imprisonment of 2-5 years and when the victims are children from 3-7 years imprisonment. With the new provisions, in accordance with Article 6 of the Convention of E Caim of demand-side shock, as a preventive measure against trafficking.

Another change to the Criminal Code concerning acts of trafficking is the introduction of Article 110/c, which is defined as a criminal act and actions that facilitate the trafficking of adults as "counterfeiting, possession or provision of identity documents, passports, visa or other travel documents or retention, removal, concealment, damage or destruction "[10], which is punishable by 2-5 years and in case of facilitation of child trafficking is punishable by 4-8 years. Although the legislature has sought to harmonize the Penal Code with the Convention ECas regards the provisions of substantive criminal law, yet in this article there is confusion as regards the scope of performance of the actions mentioned above, the purpose of trafficking persons.

While in terms of protection that provide special legislation, the new law for "foreigners" of 2013, in paragraph 1 of article 54 "The issuance of residence permits to victims of human trafficking "provides for a period of reflection and recovery 3 months for victims of trafficking foreigners to leave the influence of traffickers and to explore the possibility of cooperation with the authorities responsible for the investigation of criminal trafficking. T his is possible through the device with a residence permit for a period of 3 months, regardless of the will of his /her to cooperate with justice, when there are reasonable grounds to believe that the alien is a victim or potential victim of trafficking, the identified as such by the structures responsible for the identification and referral of victims of trafficking. T his permit is given to the victim or potential victim of trafficking in order to recover, and treated by physical and mental condition for obtaining a knowledgeable decision to cooperate or not with justice. During this period, they enjoy all the rights as victims of trafficking under applicable law. [11]

Also, a special protection was offered to victims of trafficking as protected witnesses based on the Law on "protection of witnesses and collaborators of justice"[12]. This law has become the definition of "person protection or" witness to justice ". "Witness of justice", according to this law, a person who, as a witness or the injured person makes statements or testifies to facts and circumstances that constitute evidence in a criminal proceeding and that, because of these statement or testimony is in a dangerous situation. Victims of trafficking can appear frequently in this procedural position, but so far in this program is included only a victim of trafficking in 2011[13].

When victims of trafficking appear as witnesses in providing evidence or testimony are accompanied police officers to the Serious Crimes Court, assisted by representatives of various organizations that conduct activities in this field.

Special measures for protection of witnesses apply where the application of the ordinary measures of witness protection justice is not sufficient and appropriate, the person admits cooperate freely with the prosecution and the Court of Serious Crimes as through his testimony complete, made without conditions and reservations, provides data based constituting evidence related to a criminal investigation for serious crimes, assist in preventing the commission of a serious crime or reduce the consequences arising from their help repair the damage and losses caused by the commission of serious crimes.

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[9] Criminal Code, Article 110 / b "benefit or use of services provided by persons trafficked"
[10] Criminal Code, Article 110 / c "Actions that facilitate trafficking," added Law nr. 144 / 2013 "On amendments and additions to Law No. 7895, dated 27.1.1995" Criminal Code of the Republic of Albania "amended" in Article 27
[11] Law no. 108/2013 "For foreigners", points 1 and 2, Article 54
[12] Dt. 415.03.2004"Për 9205 law protecting witnesses and collaborators of justice '
[13] ONAC Report on the Implementation of the National Plan of Action against Trafficking in Persons, 2011

Implementation of special measures of protection of the witness only if he is placed in a real, concrete and serious, it is convenient to be involved with these measures, with their free will accept and actively participates in the implementation them. Special measures of protection for witnesses, collaborators of justice and persons close to or related with them are those dealing with the change of identity, residence, temporary protection of identity, data and documents of the protected person, declarations of a witness under another identity and their administration with special means for voice distortion, true to his appearance and other forms defined by law.

Also, Article 8 of the law "On the organization and functioning of the Court of First Instance for Serious Crimes"[14] It provides that the courts for serious crimes and the Court of Appeal for Serious Crimes may allow the questioning of witnesses, as well as confrontations and permissible readings be applying, together or separately, the following rules: a) the presence of the defendant and defenders, but without visual contact; b) without communicating the defendant and the witness's identity; c) in other cases and manner specified by the legislation on the protection of witnesses and collaborators of justice[15].

Other important rules for the protection of witnesses under Article 361/A-1 of the Code of Criminal Procedure. According to this article, the question of protected witnesses can be conducted at a distance via audiovisual connection, according to the rules laid down in Article 361 /7 of the Code of Criminal Procedure. These are guarantees effective and feasible treatment and protection of victims of trafficking under the required conditions.[16]

- The position of the victims of trafficking in the trial of offenses of trafficking

As mentioned above, the issue of positioning problems of a victim of trafficking in the process of investigation and trial as a witness where the competent Court for Serious Crimes[17] It related to the lack of legal provisions positioning of the victim as a party in the role of a witness unless procedural or civil plaintiff for pecuniary damage.

When the victim came to the witness stand in most cases, as noted during the interview prosecutors proceeded to the evidence[18] the statements of the victims/witnesses in the preliminary investigation stage. T his measure is taken because often give victims the report and during the trial when they appear as a witness in proceedings against traffickers, represent another situation due to intimidation by traffickers. During the hearing of securing evidence

[14] Law no. 9110, dated 24.07.2003 "On the organization and functioning of the Court of First Instance for Serious Crimes"

[15] Law no. 9110, dated 24.07.2003 "On the organization and functioning of the First Instance Court for Serious Crimes," Article 8 "question witnesses

[16] Sander Simoni: "The treatment of trafficking victims as witnesses during the trial. Legal options for compensation of victims of trafficking and the need for legal changes. Problems encountered in the judicial practice. "Tirana, February 2013

[17] Article 74 of the Code of Criminal Procedure It provides on subject matter jurisdiction of the district court judgment of those offenses that do not belong to the competence of the court for serious crimes and the High Court. While, under Article 75 / a "The powers of the Court for Serious Crimes" of the Code of Criminal Procedure, the Court for Serious Crimes has under its jurisdiction the trial of 33 offenses, which would include the prosecution of criminal acts of trafficking, namely Article 110 / a and Article 128 / b envisaged by the Criminal Code. Thus, the judgment of the offense of exploitation of prostitution, pursuant to Article 114 of the Criminal Code, does not rank among the criminal trial which is Gj. KR's competence, hence in accordance with Article 74, "The powers of the district court "Code of Criminal Procedure of the criminal trial is the competence of the district court proceedings.

[18] Code of Criminal Procedure, Article 316 "Security Test Cases"

for these witnesses is applied Article 8 of the law "On the organization and functioning of courts for serious crimes "by asking without visual contact".[19]

From the case law of the Supreme Court concluded that during the questioning of victims at a time when they are considered as damaged by criminal acts to law enforcement in general have not applied their right under Article 158 of the Procedure Code P. for exemption from the obligation to testify, leading to dissolution of the injunction because the administration of proof in violation of criminal procedural law[20]. Similarly, Article 158/C/2 of the Criminal Procedure Code provides that it is not obliged to testify who, though not the defendant's spouse, cohabiting or has cohabited with him. The logic of lawmakers in the drafting of this provision has been the preservation of the principles of a socially important, as is that between spouses or cohabitants, excluding this about subjects from having to testify at trial of criminal proceedings dependent on their relatives, about events and facts on which they are aware. In particular, the legislator has recognized a special status spouse, former spouse, partner or person associated with the adoption of the defendant in a criminal proceeding, making it mandatory for the body of procedure in any case, even when the charge of the work of It is made of these subjects at the time of administration of the evidence they need to be made known right not to testify. In this way, the legislator has separated itself this about subjects other persons provided by article 16, which, despite the connection to the defendant, as long as the predicates in quality cannot be exempted from having to testify.[21]

Indemnity and compensation of victims

Legislation does not exist a special law for compensation and reparation for victims. The only possibility that victims under criminal procedural law to compensation for the damage that was caused is through a civil lawsuit in the criminal process. The civil lawsuit in the criminal process provided for in Article 61 of the Criminal Procedure Code[22] and entitles the victim as a civil plaintiff, require through a civil action in the criminal proceedings against the trafficker or civil defendant, property restitution and compensation. Also, victims of trafficking may file a separate civil suit in civil court by referring to Article 647 /a of the Civil Code, the remuneration of non-pecuniary damage. The civil lawsuit, provides protection for the victim because her request as civil plaintiff, the proceeding in order to ensure the return of property and compensation for the damage, impose seizure of property of the defendant or civil defendant. T his measure stands until the end of the matter[23].

In case the court gives a decision of acquittal for the defendant, because the fact is not provided as a criminal offense, or when the decision to terminate the criminal case, the civil lawsuit left unexamined denying thereby the victim the right to compensation. Another drawback is the fact that procedural civil lawsuit in the criminal process can be used under Article 61 of the Code of Criminal Procedure only for pecuniary and non-pecuniary damage not by depriving victims of their right to seek compensation of non-pecuniary damage in a criminal process. As noted above, this right can be enjoyed by direct indictment in civil court, claim that this court has. "Problems of cost, time and the outcome uncertain"[24].

Besides compensation from the trafficker, there is another way to compensate the victim, through a public scheme. In our domestic legislation that provided for in Law no. 10192, dated 3.12.2009 "On prevention and suppression of organized crime and trafficking through preventive measures against assets". Specifically, Article 37 of the law stipulates the

[19] Sander Simoni: "The treatment of trafficking victims as witnesses during the trial. Legal options for compensation of victims of trafficking and the need for legal changes. Problems encountered in judicial practice ", Tirana, February 2013
[20] Code of Criminal Procedure, Article 151/4 "Taking of evidence".
[21] Decision no. 555 of the Criminal Panel of the Supreme Court, page 8.
[22] Code of Criminal Procedure, Article 61 "civil lawsuit in the criminal process".
[23] Code of Criminal Procedure, Article 63 "Providing civil lawsuit."
[24] "Compensation for trafficked persons and exploited in the OSCE region", OSCE, Warsaw 2008

establishment of a Special Fund for the Prevention of Crime, which serves among other things, to come to help victims of crime, including victims of trafficking, and to promote social programs for this category. This provision is in accordance with paragraph 4 of Article 15 of the EC, which provides for sanction by the domestic law of the parties, the establishment of a fund for victim compensation or measures or programs of compensation, aimed at protection and social integration victims, programs that may be financed by assets confiscated traffickers. On the other hand, in practice the implementation of this provision is found to be less effective, because the law has not directly predict how a victim of trafficking can benefit from this fund, through administrative or penal process and civil.

According to professionals in the field, the most efficient way to guarantee this right victims would be simultaneous judgment of the author, trafficker and lawsuit seeking compensation, as this would facilitate the victim psychologically and reduce procedure and costs. This is supported and the findings of a study of the OSCE on compensation for trafficked persons and exploited, which state that "to prove the damage by evidence of victimization past and present, as well as names or definitions of certain categories of damage as "loss of dignity" may re-traumatizing effect on the trafficked person "[25].

Also, compensation to the victim could be done by determining the compensation as part of major penalty against the trafficker, the main aim being to compensation from the offender, who has caused the damage and the suffering of the victim.

Conclusions

Our system is an accusatory system, so there are in the spotlight of the offender and the sole purpose of criminal sanctions are the author's detention, prevention of commission of criminal offenses by others, and the rehabilitation of the author through the penitentiary system. While the restitution and compensation of victims do not constitute in itself the purpose of the criminal sanction. Albanian Criminal Code in its general part does not recognize the term "victim" as this part focuses mainly on general concepts of crime, criminal liability and criminal sanctions, while the Code special deals with specific offenses. This means that the victim does not appear as a separate entity, independent of the criminal law, as such it does not have standing as a party in criminal proceedings as the prosecution, the defendant and the court.

While the Code of Criminal Procedure mention the term "person aggrieved", through which the injured party is known as the subject procedural figures offense and defective material from the offense, which among them are not provided trafficking offenses, Article 110 /a "Trafficking of adults" and Article 128 /b" Trafficking of Minors", thereby excluding the right of trafficking victims to legitimize the subject of separate proceedings.

Legislation does not exist a special law for compensation and reparation for victims. The only possibility that victims under criminal procedural law to compensation for the damage that was caused is through a civil lawsuit in the criminal process. The civil lawsuit in the criminal process provided for in Article 61 of the Criminal Procedure Code and entitle the victim as a civil plaintiff, require through a civil action in the criminal proceedings against the trafficker or civil defendant, property restitution and compensation. Also, victims of trafficking may file a separate civil suit in civil court by referring to Article 647 / a of the Civil Code, the remuneration of non-pecuniary damage.

Literature

[1] Sander Simon "The treatment of trafficking victims as witnesses during the trial. Legal options for compensation of victims of trafficking and the need for legal changes. Problems encountered in judicial practice. "Tirana, February 2013

[2] Criminal Code, Article 113 "Prostitution"

[25] "Compensation for trafficked persons and exploited in the OSCE region", OSCE, Warsaw 2008

[3] Criminal Code, Article 110/b "benefit or use of services provided by persons trafficked"
[4] Criminal Code, Article 110/c "Actions that facilitate trafficking, "added Law nr. 144/2013 "On amendments and additions to Law No. 7895, dated 27.1.1995 "Criminal Code of the Republic of Albania "amended" in Article 27
[5] Law no. 108/2013 "For foreigners", points 1 and 2, Article 54
[6] Dt. 415.03.2004 "Për 9205 law protecting witnesses and collaborators of justice ”
[7] ONAC Report on the Implementation of the National Plan of Action against Trafficking in Persons, 2011
[8] Code of Criminal Procedure, Article 316 "Security Test Cases"
[9] Decision no. 555 of the Criminal Panel of the Supreme Court, page 8.
[10] Code of Criminal Procedure, Article 61 "civil lawsuit in the criminal process".
[11] Code of Criminal Procedure, Article 63 "Providing civil lawsuit."
[12] Compensation for persons trafficked and exploited in the OSCE region, OSCE, Warsaw 2008
[13] Code of Criminal Procedure, Article 151/4 "Taking of evidence".
[14] Law No. 7895, dated 27.1.1995 "Criminal Code of the Republic of Albania", as amended, Article 58 "The rights of the victim of crime" and Article 59 "The injured accuser"
[15] Law no. 8920, dated 11.7.2002, "On the ratification of the U N Convention against Transnational Organized Crime and its two additional protocols", paragraph 3 of Article 25 "Support and protection of victims' Convention
[16] Law no. 8920, dated 11.7.2002 "On the ratification of the U N Convention against Transnational Organized Crime and its two additional protocols", paragraph 2, Article 6 "Assistance for the protection of victims of trafficking in persons"
[17] Law no. 9110, dated 24.07.2003 "On the organization and functioning of the Court of First Instance for Serious Crimes"
[18] Law no. 9110, dated 24.07.2003 "On the organization and functioning of the First Instance Court for Serious Crimes, "Article 8 "question witnesses
[19] Penal Code, Article 52 /or adding to the law 144/2013, dated 05/02/2013, Article 7

The Use of Mobile Phones among Undergraduate Students-a Case in Ghana

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Abstract

The response to the development and growth of mobile phones in Africa has introduced new ideas in education, business, health, and banking needs of a country. Ghana has become a great place for mobile technology implementation to thrive as there are enough users to support the relevant technologies. In fact, the latest industry statistics released by the National Communications Authority state that, out of a population of 24.97 million, there are approximately 24.4 million subscribers on at least one of the five active mobile networks in the country. The objective of the study is to review the level of usage of the mobile phone by college students in both the private and public institutions in Ghana. The study looked at what the average student's level of usage of the mobile phone on a daily basis and the frequency of usage for the following activities; education-related research, personal finance, religious activities, making and receiving calls, current events. work related research, playing games watching movies, listening to music and social networking. The research revealed that 20.0% of the respondent always listening to music on their mobile phones, playing games 7.9%, watching movie 2.0%, social networking 46.5% , work-related research 12.9%, educational-related research 17.8%, religious programmes 3.2%, personal finance 15.0%, current events 3.2% and making and receiving calls 65.0%. The research also looked at the duration of usage by the students at school, home and at the work place. When it comes to using the mobile phone at home 32.0% said they spent 7 hours or more on their mobile phone at home, 9.9% spent 7 hours or more at school and 3.5% spend the same hours or more at the office.

Key Words: *Mobile phone, undergraduates, Ghana.*

Introduction

Africa now has more than 650 million mobile phone subscribers. That's more than either the United States or the European Union. And it's a market that has seen explosive growth. Since 2000, the mobile phone market has grown 40-fold, from 16.5 million, according to the world bank (Yonazi, E., Kelly, T., Halewood, N., & Blackman, C., 2012, p. 22).

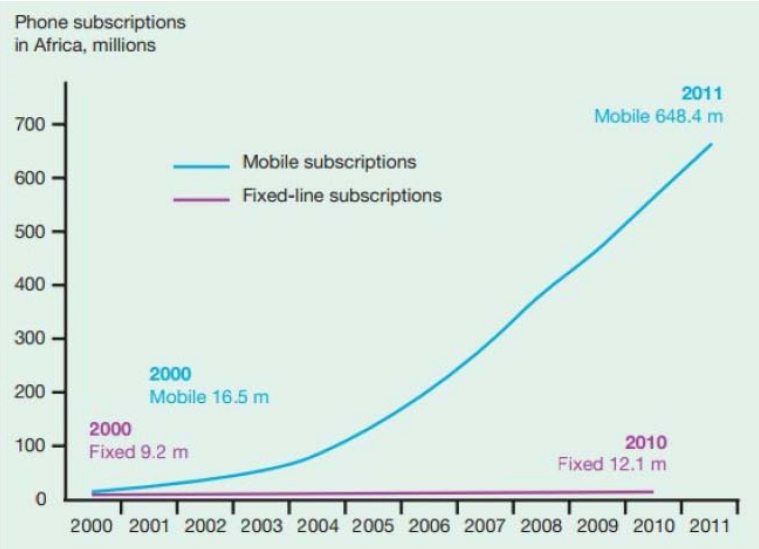

Figure 1

Africa trailed only South Asia as the region with the largest average mobile growth rate from 2000-2011 (Yonazi, E., Kelly, T., Halewood, N., & Blackman, C., 2012, p. 22). According to Yonazi, E., Kelly, T., Halewood, N., & Blackman, C. (2012), Jamal Saghir, World Bank Director for Sustainable Development in the Africa Region, said in a statement; "The Internet and mobile phones are transforming the development landscape in Africa, injecting new dynamism in key sectors. The challenge is to scale up these innovations and success stories for greater social and economic impacts across Africa over the next decade,". The rise in ICT in Africa has also led to a growing number of technological hubs; from Kenya's iHub to Senegal's BantaLabs. "Africa is rapidly becoming an ICT leader. Innovations that began in Africa – like dual SIM card mobile phones, or using mobile phones for remittance payments – are now spreading across the continent and beyond," said Tim Kelly, lead ICT policy specialist at the World Bank and an author of the report, in a statement. "The challenge going forward is to ensure that ICT innovations benefit all Africans, including the poor and vulnerable, and those living in remote areas " (Yonazi, E., Kelly, T., Halewood, N., & Blackman, C., 2012, p. 31).

Ghana was recently listed at number 14 by the World Bank in the Top 29 countries with the highest growth based on 2013/2014 growth estimates – and what we are seeing is that many of the countries in Africa experiencing fast paced growth are adopting various mobile and ICT technologies, which have helped them reach such high growth projections. By utilising mobile technology, new ideas are able to emerge out of pure necessity to meet the educational, business, health, and banking needs of a country. Ghana is a great place for mobile technology implementation to thrive as there are enough users to support the relevant technologies (Assabi, 2012)

The latest mobile cellular subscriber base figures for the period ending August 2014, indicate that mobile data subscribers in the country now account for almost 50% of total number of mobile phone lines and over 55% of Ghana's population. As at the end of August 2014, the total mobile subscriptions in the country was 29,531,488, while total data subscribers also reached 14,615,048, which is 49.5% of the total. Meanwhile, at the end of August 2014, the country's population was estimated at 26,566,240 so the number of mobile data customers constituted 55.01% of the population (Dowuona, 2014).

This study looked at the average university student's level of usage of the mobile phone on a daily basis. The study adopted a survey research approach. The research revealed that 20.0% of the respondent always listen to music on their mobile phones, 7.9% played games, 2.0% watched movie, social networking had 46.5% , work-related research 12.9%,

educational-related research 17.8%, religious programmes 3.2%, personal finance 15.0%, current events 3.2% and making and receiving calls 65.0%.

Methodology

The objective of this study was to obtain the current mobile phone usage by undergraduate students in Ghana . The study adopted a survey research approach. The survey strategy is usually the preferred choice for collecting original data from a large population of interest at lower cost (Trochim, 2009). Surveys have become a widely used and acknowledged research method. The concept of considering information derived from a small number of people to be an accurate representation of a significantly larger number of people has become a familiar one. Since the mobile phone provides a source from which general information is known or can be collected, Survey research is considered an appropriate technique for this study. Data collected from the survey covered; Phone category, Nationality and Type of Student.

Table 1: The various Category of Phones students use.

Phone Category

		Frequency	Percent
Valid	No Response	4	.5
	Conventional	147	16.9
	Smart	718	82.6
	Total	869	100.0

Table 2: The Nationality of Student who responded to the survey

Nationality

		Frequency	Percent
Valid	No Response	3	.3
	Ghanaian	815	93.8
	Nigerian	42	4.8
	Togolese	3	.3
	Ivorian	1	.1
	Others	5	.6
	Total	869	100.0

Table 3: Distribution of the various student types

Student Type

		Frequency	Percent
Valid	No Response	1	.1
	Full Time	781	89.9
	Evening	54	6.2
	Weekend	33	3.8
	Total	869	100.0

Category of phones used by the students, 16.9% were using the conversional phones and 82.6% smart phones. (Table 2). On nationality because Ghana now has quite a sizable number of foreign students. 93.8% were Ghanaians, 4.8% Nigerians, 3% Togolese and 1% Ivoirians. (Table 3).

The research also looked at the hours per week the average student actively used the mobile phone at school, home and at the office especially evening and weekend students.

A paper-based survey was developed and administered by the authors. Out of the 900 questionnaires that were administered, 869 were received. The survey results were evaluated using SPSS. From the 869 respondents 51.2% were male and 48.8% were female. Table 3 indicates that 89.9% were full time students, 6.2% evening students and 3.8% weekend students.

Results and Discussion

The respondents were asked to indicate the purpose of their use of the mobile phone under classifications such as playing games, listening to music, watching movie, social network, work-related research, educational related research, religious activities, personal finance, current events and making and receiving calls (Table 4).

Table 4: Percentage distribution of the Purpose of usage of their mobile phones

	PERCENTAGE						
PURPOSE OF MOBILE PHONE USE	Always	Frequently	Occasionally	Rarely	Never	No Response	Total
Playing Games	7.9	18	25.8	26.2	19.6	2.5	100
Listening to Music	20.0	30.8	28.4	15.4	4.3	1.1	100
Watching Movies	2.0	4.4	15.7	30.8	43.6	3.5	100
Social Network	46.5	31.6	8.7	4.2	7.5	1.5	100
Work-Related Research	12.9	29.2	33.9	9.3	9.3	5.4	100
Educationally Related Research	17.8	38.7	28.0	7.5	4.7	3.3	100
Religious	15.1	23.6	28.1	14.2	13.2	5.8	100
Personal Finance	3.2	7.9	17.8	23.2	43.3	4.6	100
Current Events	15.0	22.1	24.1	18.8	16.8	3.2	100
Making and Receiving Calls	65.0	24.1	6.2	1.8	0.9	2.0	100

Playing games

The mobile phone provides a lot of entertainment and games for users. It has become a means by which users can play a lot of games. The research revealed that 7.8% of the respondents always play games on their mobile phone, 18% frequently, 25.8% occasionally, 26.2% rarely play games, 19.6% and never play games.

Listening to music

The mobile phone provides musical entertainment and free videos for lovers of music which can be downloaded onto the phones. The research revealed that 20.0% of the respondent always listened to music on their mobile phones, 30.8% frequently, 28.4% occasionally, 15.4% rarely and 4.3% never listen to music on their mobile phones.

Watching movies

The mobile phone is now well suited for watching movies. Users of smart and android phone download and watch movies on their phones. The research revealed that only 2.0% of the respondents always watch movies on their mobile phones. 4.4% frequently, 15.7% occasionally, 30.8% rarely and 43.4% never watch movies on their mobile phones.

Social network

Today's mobile phone offers the opportunity for users to create online social network among students. It provides the many-to-many communication medium, unlike the conversional one-to-many communication medium. The research showed that 46.5% of the respondent always have social network online on their mobile phones. 31.6% frequently, 8.7% occasionally, 4.2% rarely and 7.5% never.

Work-related research

A lot more Ghanaians now use the mobile phone for work- related research. The research showed that 12.9% of the student respondents always use the mobile phone for work-related

research. 29.2% frequently, 33.9%, occasionally, 9.3% rarely and 9.3% never use it for work-related research.

Educational related research

Today the mobile phone provides learning platform applications including downloading online educational videos and lecture notes and assignments. The research revealed that 17.8% of the student respondents always use their mobile phones for educational related research, 38.7% use it frequently, 28.0% occasionally, 7.5% rarely and 4.7% never used it.

Religious activities

In Ghana religion has become an integral part of the society so the use of the mobile phones to download sermons, teachings, songs, sharing of testimonies and prayer. The research showed that 15.1% of the respondent always download religious activities on their mobile phones, 23.6% use it frequently, 28.1% occasionally 14.2% rarely and 13.2% never use it.

Personal finance

Internet access and web application services and platforms make it easier for online users to make purchases online. Today we have mobile banking and mobile commerce. People can now access their finances and also shop online. 3.2% of the respondent always uses the mobile phone to access their personal finance, 7.9% use it frequently, 17.8% occasionally, 23.2% rarely and 43.3% never use it.

Current events

The mobile phone is now an important medium for people to search for the latest happenings around the world by a tap on their phone. The research revealed that 15.0% of the respondents always use their mobile phones to access current events, 22.1% use it frequently, 24.1% occasionally, 18.8% rarely and 16.8% never use it.

Making and receiving calls

The main conversional use of the mobile phone is to make and receive calls. The research showed that 65.0% of the student respondent always use the mobile phone to make calls, 24.1% frequently use it, 6.2% occasionally use it 1.8% rarely use it and 0.9% said they never use it.

Duration of use

The research also looked at the duration of use by the student at school, home and at the work place. This is shown on table 5, 6, and 7. The durations are from one hour to seven hours and more. When it comes to using the mobile phone at home 32.0% said they spent 7 hours or more on their mobile phone at home, 9.9% spend 7 hours or more at school and 3.5% spend the same hours or more at the office. When it comes to using the phone for just an hour, 13% said they use it for an hour at home, 21.6% at the office and 43.2% at school.

Table 5: Hourly distribution of how student use their phones at Home

When at Home Use

		Frequency	Percent
Valid	0 -1 Hr	113	13.0
	2-3 Hrs	206	23.7
	4-5 Hrs	168	19.3
	6-7 Hrs	96	11.0
	More Than 7 Hrs	286	32.9
	Total	869	100.0

Table 6: Hourly distribution of how student use their phones at Office

When at Office

		Frequency	Percent
Valid	No Response	534	61.4
	0 -1 Hr	188	21.6
	2-3 Hrs	67	7.7
	4-5 Hrs	30	3.5
	6-7 Hrs	20	2.3
	More Than 7 Hrs	30	3.5
	Total	869	100.0

Table 7: Hourly distribution of how student use their phones during School hours

When at School Use

		Frequency	Percent
Valid	No Response	71	8.2
	0 -1 Hr	375	43.2
	2-3 Hrs	165	19.0
	4-5 Hrs	120	13.8
	6-7 Hrs	52	6.0
	More Than 7 Hrs	86	9.9
	Total	869	100.0

Conclusion

The effect of ICTs on the African economy is impressive, but it is the way they are changing the lives of ordinary Africans that is genuinely transformational (Yonazi, E., Kelly, T., Halewood, N., & Blackman, C., 2012, p. 13). E-Marketer expects 4.55 billion people worldwide to use a mobile phone in 2014. According to Husson and Ask (2014), Mobile adoption is slowing, but new users in the developing regions of Asia-Pacific and the Middle East and Africa will drive further increases. Between 2013 and 2017, mobile phone penetration will rise from 61.1% to 69.4% of the global population. Mobile phones and the internet are helping to release the dynamism of African society (Yonazi, E., Kelly, T., Halewood, N., & Blackman, C., 2012, p. 13). It is believed that mobile phones have the potential of having a central place in the daily lives of undergraduates (Amali I., Onche. O., Bello M. B & Hassan I., 2012). The latest mobile cellular subscriber base figures for the period ending August 2014, indicate that mobile data subscribers in Ghana now account for almost 50% of total number of mobile phone lines and over 55% of Ghana's population (Dowuona, 2014). The objective of this study was to obtain the current mobile phone usage by undergraduate students in Ghana. The study adopted a survey research approach. The survey strategy was usually the preferred choice for collecting original data from a large number of undergraduate students.

The study looked at the looked at the average student's level of usage of the mobile phone on a daily basis and the frequency of usage for the following activities; educational-related research, personal finance, religious activities, making and receiving calls, current affairs (news), work related research, playing games, watching movie, listening to music and social networking. The research revealed that 20.0% of the respondent always listened to music on their mobile phones, 7.9% played games, 2.0% watched movies, 46.5% on social network, 12.9% for work-related research, 17.8% for educational-related research, 3.2% for religious programmes, 15% for personal finance, 3.2% on current events and 65.0% for making and receiving calls. The research also looked at the duration of use by the students at school, home and at the work place. When it comes to using the mobile phone at home 32.0% said they spent 7 hours or more on their mobile phone at home, 9.9% spend 7 hours or more at school and 3.5% spend the same hours or more at the office.

References

[1] Amali I., Onche.O., Bello M. B & Hassan I.(2012), A Survey of University of Ilorin Students' Use of Mobile Phone in Lecture rooms and its Implications in Education for Nigeria Development, Journal of Education and Practice, Vol. 3. No. 10

[2] Assabi Yaron, (2012), CEO of Digital Solutions Group, The transition of mobile in Africa and Ghana, Retrieved from: www.modernghana.com

[3] Dowuona S. N. N. (2014), Ghana records over 55% mobile data penetration, Retrieved from: http://www.myjoyonline.com/business/2014

[4] Husson, T., & Ask, J. A. (2014). Predictions 2014: Mobile Trends For Marketers. Navigate Beyond the Hype to Drive Near-Term Results.

[5] Nyarko, E. (n.d.) Developing ICT enabled education: The future for Ghana., Retrieved from: http://www.iconnect-online.org/Documents/

[6] Quarshie H. O. & Ami-Narh J. (2012), The Growth and Usage of Internet in Ghana, International Journal of Emerging Trends in Computing and Information Sciences (E-ISSN 2218-6301/ ISSN 2079-8407), Vol. 3, N. 9.

[7] Quarshie. H., O. (2012), The Impact of Computer Technology on the Development of Children in Ghana, Journal of Emerging Trends in Computing and Information Sciences, May,. 3(5): p. 717 - 722

[8] Sey, A. (2010). Managing the cost of mobile communications in Ghana. Communication Technologies in Latin America and Africa, 143-166.

[9] Yonazi, E., Kelly, T., Halewood, N., & Blackman, C. (2012). The transformational use of information and communication technologies in Africa. The World Bank, Washington, DC

Characterization of Designed and Constructed Optical System

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Abstract

This laboratory work emphasize on the characterization of designed and constructed grating spectrometer . This was done by measuring the diffraction efficiency of the fabricated grating. The fabricated grating is a binary grating with height 650 nm, period 880 nm and fill factor 0.40 nm. The light source used were laser sources and halogen lamp with wavelength range 532 nm and 473 nm. CCD line camera is used as a detector having 3648 pixels with each pixel having a size of 8µm. The diffraction efficiencies and filter transmittance measured with the Perkin Lambda 18 spectrophotometer are compared with the constructed spectrometer. The characterization is done by measuring the full width half maximum (FWHM) of the detected laser line peaks by the constructed spectrometer.

Introduction

Spectroscopy is the study of the principles of light -matter interaction or the science of analyzing and interpreting a spectra. Generally spectroscopy is a term used to describe the interactions of various types of electromagnetic radiation with matter and it involves the analysis of light over a range of wavelengths such as wavelength of visible light. The radiation interacts with matter is directly dependent on the energy of the radiation. In spectroscopy electromagnetic wave incident on a sample characterize light after sample and characterize change in sample. The sample is characterize depending on the amount of light absorbed, emitted or the optical rotation. Absorption is the change in intensity of incident light (transmission) at different frequency or wavelength. Emission includes fluorescence, phosphorescence or raman scattering and optical rotation is the change of light incident on the sample (rotation of polarization) [1]. The main instrument use in spectroscopy is the spectrometer. A spectrometer is a device that is used to measure the properties of light emitted by a source or spectrometer is an instrument used to analyse the nature of light emitted by various sources depending on properties such as refraction, absorption, reflection and interference. The main idea in spectrometer is to split light into its components wavelength, generate a spectrum and determines its physical and chemical properties of materials. The principle behind the operation of spectrometer is that light diffracts as it traverses from one homogeneous medium to another and the diffraction angle is a function of wavelength or frequency. Spectrometers are normally designed to measure specific wavelength range of the electromagnetic spectrum. The choice of components for the design depends on the source of light to be measured. Based on these unique features of spectrometers, they are employed in many fields of study. For example in astronomy or astrophysics, spectrometers are used to measure velocities of galactic components, composition of stars and nebula chemical makeup [2]. Diffraction grating is an optical component with a periodic structure, which splits and diffracts light into several beams traveling in different directions. The different kind of gratings used in spectrometer could be reflection grating or transmission grating. Reflection grating consist of a grating superimposed on a reflective surface whereas transmission grating consist of a grating superimposed on a transparent surface [3]. Other type of gratings could be holographic grating which is produced by interference lithography, gel grating (phase or amplitude), echelle grating (cross dispersion) and each of these could be classified into either transmission or reflection type of grating. Finally grating can also be blazed, binary, concave and sinusoidal depending on the shape of its grooves.

There are a number of different spectrometers, each of which is designed to achieve different goals but their operational mechanisms are similar. Every spectrometer consists of three major components, diffraction layer made of diffraction grating/glass prism, collimating and focusing lenses/mirrors and detector [4]. Fig.1.1. describe the general working principle of a spectrometer. Light from a given source enters from position (1) through fixed entrance slits (2 and 3) which specify the width of the incident beam. The thin beam of light travels the length of the housing until it reaches a lens/mirror (4), which collimates the beam. The collimated beam is then intersected by diffraction grating (5) which disperses the different wavelengths (colors) of light, because the diffraction angle is a function of wavelength. This dispersed beam is collected and focused on the detector (7) by the focusing mirror/lens (6). The properties of the light is then measured based on the scales on the detector. Most detectors are calibrated to measure the intensity or polarization state of the light beam [5]. In this laboratory work the task is to first, the efficiency of the constructed binary diffraction grating spectrometer is measured and compared with the theoretically designed values to that of the commercial spectrophotometer. The constructed spectrometer is then characterized by calculating the spectral resolution. Chapter two reviews the experimental set up, procedure and results. Chapter three reviews discussion of results and Chapter four finally reviews the conclusion part of the work.



Figure 1.1: Schematic diagram of how light propagates through a commercial spectrometer [5].

Experimental setup and Characterization

This chapter reviews the equipment, experimental setup and the characterization are described in detail.

Equipments

The equipments used in the experiment includes the following:

1. Two lasers (473 nm and 532 nm)
2. Mirrors
3. Lenses
4. Optical breadboard
5. Power meter
6. Diffraction grating
7. Halogen lamp
8. CCD line camera
9. Holders and mounts
10. Adhesive tape
11. Personal computer
12. Spectrophotometer (PerkinElmer Lambda 18)

13. Tool kits (balldrivers, screwdrivers and tap kits)
14. Attenuators
15. Beam splitter
16. Filter

Diffraction efficiency measurements

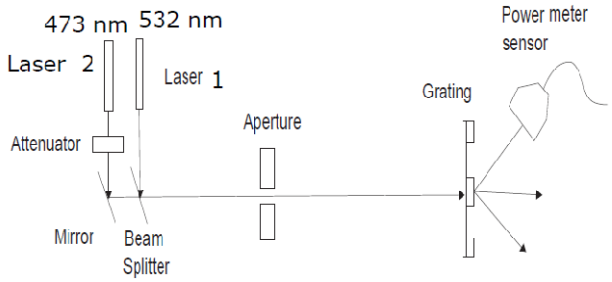

Figure 2.1: Typical diffraction efficiency measurement setup.

Fig. 2.1. depicts the diffraction efficiency measurement setup for two lasers 532 nm and 473 nm. 532 nm laser which is TM polarised is turned on and the beam is directed to the power sensor of the power meter through attenuator, mirrors, aperture and diffraction grating as shown in Fig. 2.1. It reviews that, there was a reduction in power as the beam passes through the attenuator. First the power is measured without using diffraction grating, later is placed in the holder and the power is measured for the diffraction orders, -1, 0 and +1. The grating diffraction efficiency which is the ratio of the power of diffracted light beam at a given order to that of the incident power of the beam. It is dimensionless quantity and is given by the relation:

$$\eta_m(\lambda) = \frac{I_m(\lambda)}{I_o(\lambda)} \times 100\%. \tag{2.1}$$

$I_m(\lambda)$ is the intensity of the mth order and $I_o(\lambda)$ is the incident beam intensity without diffraction grating. The experiment is repeated for the 473 nm laser which is TE polarised and the diffraction efficiency is calculated using Eq. 2.1. and the results were tabulated in chapter three. One should note that, the diffraction efficiency depends on the following factors and parameters: polarization state, spectral range of light, material from which the grating is made, grating period, fill factor and groove height [3]. PerkinElmer Lambda 18 Commercial spectrophotometer was used to measure the diffraction efficiency of the grating within the wavelength limit of 440 nm - 540 nm and the results obtained are compared in chapter three.

Spectral resolution measurement

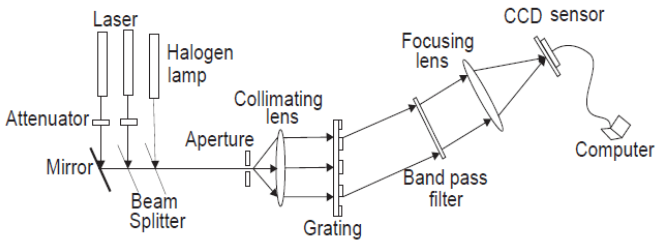

Figure 2.2: Spectrometer characterization setup.

Fig. 2.2. shows spectral resolution or characterization measurement setup which is given by the relation:

$$\delta(\lambda) = \frac{RF \times \Delta\lambda \times W_s}{n \times W_p}, \qquad (2.2)$$

where $\delta\lambda$ is the minimum difference of wavelength that the system can resolve, RF is the resolution factor that is the number of pixels acquired by one spectral line at full width half maximum (FWHM)of the laser peak, $\Delta\lambda$ is the range of wavelength, 440 nm - 540 nm. n is the number of pixels contained in the whole spectrum. W_s and W_p are the slit and pixel width equivalent to 8μm in this task. The calculation of both RF and n one can obtain the spectral resolution of the constructed spectrometer. The procedure of the experimental setup is that, the attenuation of the laser beam power, distance of the lens to that of the detector, tilt of the mirrors and the diffraction grating were carefully optimized to achieve narrow laser line peak because the sharper the peak the most relevant or best the spectral resolution and the best constructed spectrometer. For scattering (dispersive) array spectrometers one can determine the spectral resolution by considering three components, the grating sets the limit of the wavelength, detector whose pixel width sets the lower limit of spatial resolution and the slit which determine the minimum image size formed on the detector plane [6,7]. The number of pixels per nm were estimated from the two lasers, the difference of the number of pixels n at 440 nm and 540 nm were also estimated and the difference of the number of pixels at the midpoints of the laser peaks were also estimated which yields the full width half maximum (FWHM) or the resolution factor (RF) whose power is the ability of the spectrometer to segregate the adjacent lines in the spectrum [3]. Ultimately filter was inserted between the grating and the lens to measure the transmittance and the following parameters were used for the binary diffraction grating, achromatic doublet lens of 100 mm focal length, grating height of 650 nm, period of 880 nm and fill factor of 0.4. The light sources used were blue and green laser respectively as 473 nm and 532 nm.

Results

This chapter reviews the results obtained in the laboratory experiment compared to the theoretical calculations and design.

Diffraction efficiency measurement result

Table 3.1 Diffraction efficiency measurement with lasers.

	473 nm Laser		532 nm Laser	
m	$P_m(\lambda)$ mW	$\eta_m(\lambda)$	$P_m(\lambda)$ mW	$\eta_m(\lambda)$
-1	0.62	30.2%	0.96	40.1%
0	0.31	15.1%	0.19	7.9%
+1	0.63	30.7%	0.97	40.6%

The incident light intensities were measured for lasers 473 nm and 532 nm with-out diffraction grating. Respective values obtained are 2.05μW and 2.39μW. The power is measured at different diffraction orders for -1, 0 and +1 and efficiencies calculated as shown in table 3.1. The blue curve in Fig. 3.3. represents the measurement results of the PerkinElmer Lambda 18 Spectrophotometer and the asterisks represent the measurement results with the lasers. Fig. 3. 2. represent the design diffraction efficiency of the grating (theoretical design). The average efficiency was found to be about 30.1% by the measurement with the spectrophotometer and the peak efficiency at 540 nm was obtained to be around 36.0%. 473 nm the efficiency was found to be 26.2% and at 532 nm the efficiency was found to be about 35.2%. Efficiencies measured using the lasers, at 473 nm the efficiency was found to be about 30.2% and at 532 nm the efficiency was found to be around 40.1%. Difference of about 4.0% at 473 nm were observed for both measurement. Difference of about 4.9% at 532 nm were observed for both measurement. This is due to the polarization of the laser light because the light source of the spectrophotometer is unpolarised, difficulty in positioning the grating perfectly, the use of the card to block the unwanted orders of diffraction some portion of the

diffracted light was not collected by the integrating sphere inside the spectrophotometer and finally the PerkinElmer Lambda 18 Spectrophotometer is constructed carefully by professionals and very costly device which took a lot of time to built completely. The transmittance between 440 nm and 460 nm was very low because there was a drop in the diffraction efficiency at 440 nm.

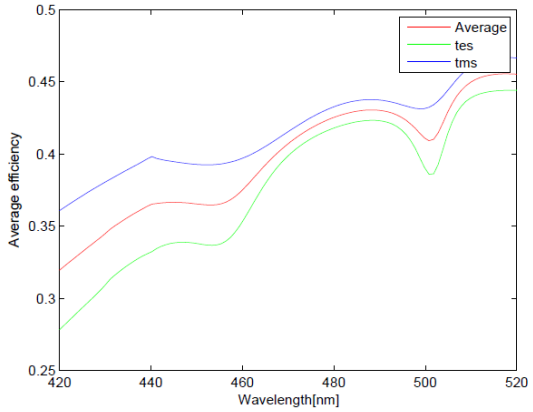

Figure 3.1: Average Efficiency of TE and TM polarization.

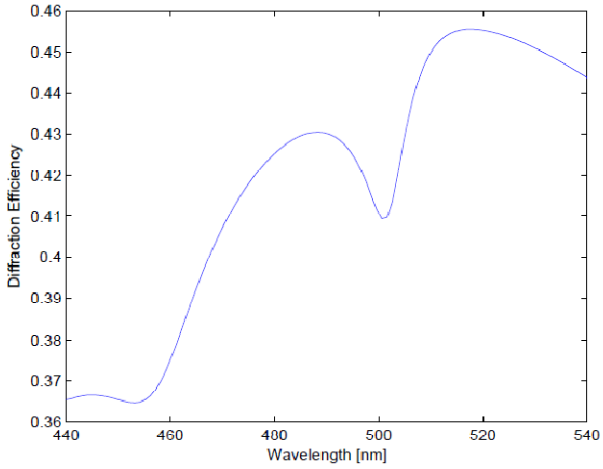

Figure 3.2: Average Efficiency of TE and TM polarization.

Spectral resolution measurement results

The task is to calculate the number of pixels in the whole spectrum (n). One can consider first the pixels per nm after then pixels at 440 nm and 540 nm respectively. The pixels of 473 nm resulted at 1411 pixels and the pixels of 532 nm resulted at 2722 pixels. The full width half maximum which is the resolution factor is obtained approximately as 3.5 pixels graphically by a matlab ginput command or numerically by curve fitting as shown in fig. 3.5.

$$\text{pixels per nm} = \frac{pixels532nmlaserpeak - pixels473nmlaserpeak}{532nm - 473nm}$$
$$= \frac{(2722-1411)pixels}{(532nm-473nm)}$$
$$= 22 \text{ pixels/nm}$$

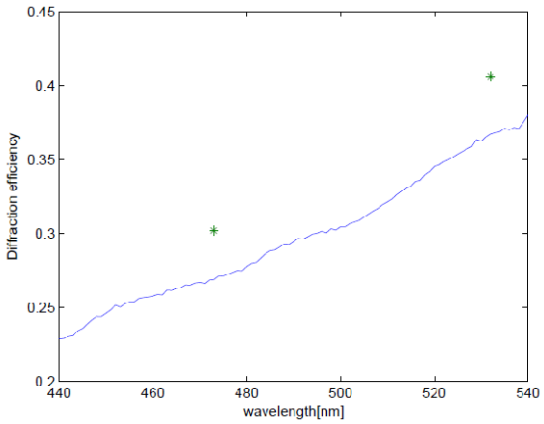

Figure 3.3: Diffraction efficiency measurement results.

Therefore ; pixels at 440 nm= pixels at 473 nm- 40 nm × 22 pixels/nm
=(1411 − 40 × 22)pixels
= 531 pixels
Again; pixels at 540 nm = pixels at 532 nm + 8 nm ×22 pixels/nm
= (2722 + 8 × 22)pixels
= 2898 pixels
Finally; n can be calculated as , n = pixels at 540 nm - pixels at 440 nm
=(2898 − 531)pixels
= 2367 pixels
substituting the values into equation 2.2, the spectral resolution

$$\delta\lambda = \frac{3.5pixels \times 100nm \times 8\mu m}{2367pixels \times 8\mu m}$$
$$\delta\lambda = 0.15 \text{ nm}$$

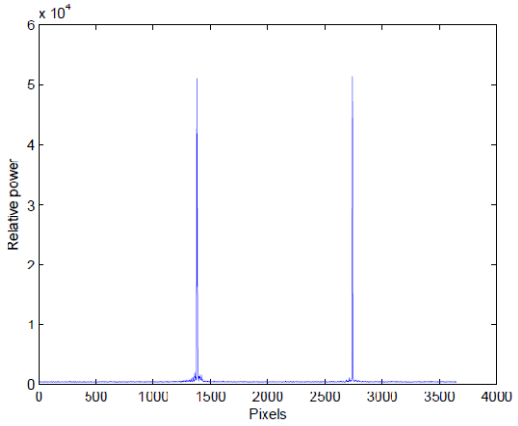

Figure 3.4: Laser line peaks measured by CCD line camera .

Therefore the constructed and designed spectrometer has a resolving power of about 0.15 nm which is 2.67 times compared to the theoretical calculations and design. Difference of about 0.25 nm. This difference could be due to irregularities in the grating period due to limitations on the fabrication, inaccurate positioning of the lens and detector, polarization of the light sources (lasers) and lastly other reason could be aberration of the lens which was not taken into account during the design phase but the aberration appears during practical arrangements. Finally resolving power of 0.8 nm is obtained at a wavelength of 540 nm.

Green filter transmittance measurement

Transmittance of a green filter was measured using Perkin Lambda 18 spectrometer and with the constructed spectrometer so that the results could be compared. First the results of the constructed spectrometer were converted to wavelength (nm) since the results were in pixel scale within the range of 1 to 3648 pixels. Fig. 3.6. illustrates the halogen lamp spectrum measured by the constructed spectrometer whereas Fig. 3.7. illustrates halogen lamp with a filter. The normalised transmittance was done by dividing the spectrum of the green filter by the halogen lamp. Fig. 3.8. illustrates comparison of normalised transmittance results of constructed spectrometer and spectrophotometer. The spectrometer has a transmittance of about 48% compared to the spectrophotometer with a transmittance of about 52% almost a difference of 4% for both. This shows that the constructed spectrometer gave a reasonable measurement of the transmittance. There was a low level of noise between 440 nm and 540 nm because signal to noise increased as the signal level increased while the noise remained constant. The noise at 440 nm is higher compared to 540 nm because the signal is less at the former point than the latter and the signal to noise ratio is inversely proportional to the signal level.

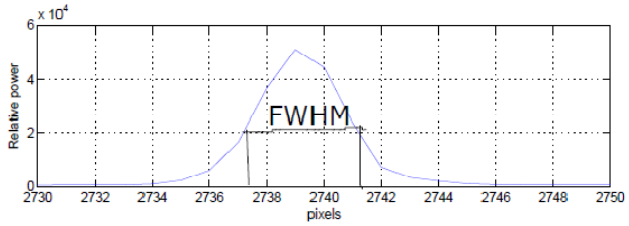

Figure 3.5: Full width half maximum (FWHM) at 532 nm laser line.

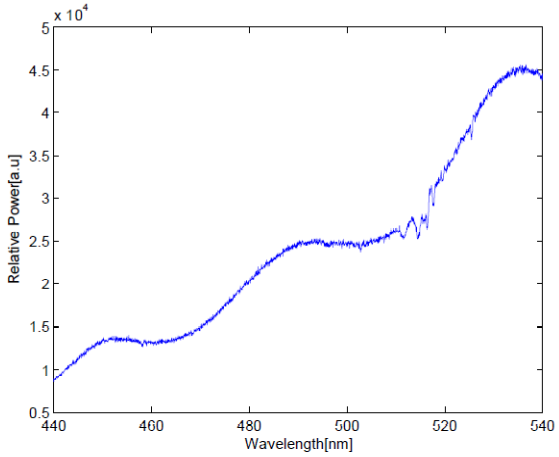

Figure 3.6: Halogen lamp spectrum.

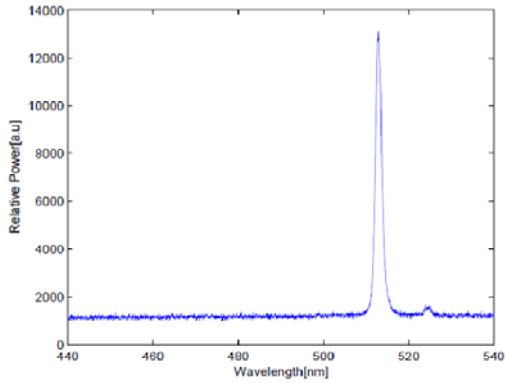

Figure 3.7: Halogen lamp spectrum with a filter.

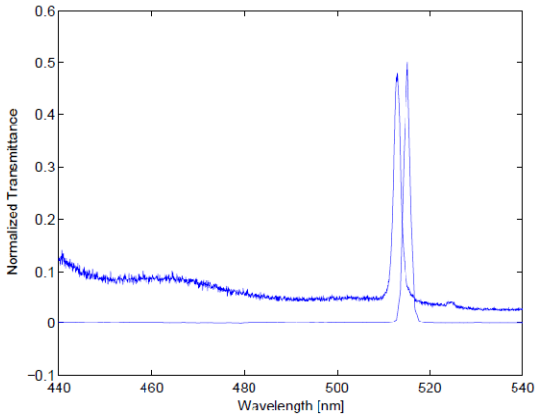

Figure 3.8: Comparison of normalized transmittance results of constructed spectrometer and spectrophotometer.

Conclusions

A constructed transmission grating spectrometer has been characterized in this laboratory work. The characterization was done by measuring the diffraction efficiency using lasers as light source and power meter as a measuring device. The results were compared with the spectrophotometer. The following results were obtained using the spectrophotometer, efficiency of 36% at 532 nm and 26.2% efficiency at 473 nm for the first minus diffraction order. The constructed spectrometer, the values obtained for the first minus order diffraction efficiencies were 30.2% at 473 nm and 40.1% at 532 nm with difference of 4.0% and 4.1% for both. Spectral resolution of 0.15 nm resulted which is 2.67 times the design, a difference of about 0.25 nm and filter transmittance of the spectrometer resulted 48% and that of the spectrophotometer resulted 52% almost a difference of 4% for both. Finally the results obtained shows that the spectrometer gave reasonable results and therefore performed well.

Bibliography

[1] J. M. Hollas, Modern Spectroscopy, 4 ed. (John Wiley and sons Limited, West Sussex, 2004).
[2] R. S. Winsor, J. W. Mackenty, M. Stiavelli, M. A. Greenhouse, J. E. Mentzell, R. G. ohi IV, and R. F. Green, "Optical design for an infrared imaging multi-object spectrometer(IRMOS)," PROC-SPIE 4092, 102–108 (2000).
[3] C. Palmer, Diffraction Grating Handbook, 2nd ed. (Wiley, New York, 1997).
[4] U. Platt and J. Stutz, Differential Optical Absorption Spectroscopy (Springer Berlin Heidelberg, 2008).
[5] http:www.oceanoptics.com/products/benchoptics ge.asp,

[6] H. Tuovinen, “Characterization of designed and constructed optical system,” University of Eastern Finland, Joensuu (2015).
[7] bwtek, http://bwtek.com/spectrometer-part-5-spectral-resolution/ (valid 2015).

Impact of Computer-Based Information Technology on Job Performance of Secretarial Staff in Nigerian

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Introduction of the study

Today's world is full of technological innovations where new discoveries and applications of new technologies have become essential. Information Technology is a revolution that involves the use of computers, the internet and other telecommunication technologies in every aspect of human endeavour (Bandele, 2006). This dynamic nature has called for the present day dynamism of the human environment, organization and management to make life better and more meaningful than what it was yesterday.

Computer-based Information Technology encompasses the effective use of equipment and programs like software, storage and audio-visual systems, which enable users to access, retrieve, convert, store, organize, manipulate and present data and information (Gay and Blades, 2005).

Rapid advancement in CBIT is drastically altering the way things are done in every field of human activity. In the University setting, the improvement in technology is enhancing university education delivery in terms of administration, service and approach. Universities in Nigeria have recently introduced CBIT into their administrative systems. This new innovation has been an advantage to the university system because of the need to key into the 21st century technological compliance and to maximize the benefits therein. (Olatokun and Tiamiyu, 2005; Popoola, 2006).

The introduction of CBIT was necessitated due to some problems encountered in the administrations of the institutions such as delay being experienced in computing students' results, transcripts, inadequate job output, staff records and other related functions on time. The management of any institution has a set of important functions to perform which include planning, organizing, supervising, reporting, coordinating, deciding, controlling, budgeting, staffing and admitting among others. (Ehikhamenor, 2002).All these functions and more are necessary to achieve set goals, objectives, policies and effective staff performance in institutions, which have to be achieved to justify combined existence. This new innovation has been laddered with series of problems mostly among secretarial staff of these universities in discharging their duties.

This study investigates CBIT and the job performance of Secretarial Staff in University of Ibadan and Ladoke Akintola University of Technology in Nigeria. The study examined the different usage of CBIT facilities available and perceived relevance of CBIT on job performance of Secretarial staff.

Related work

The concept of CBIT has become indispensable tool in today's information age and most organisations now make use of it to acquire and enhance the information needed to achieve set goals. This is the reason University of Ibadan and Ladoke Akintola University of Technology, Ogbomoso embark on the use of Computer-Based Management Information System.

According to Nwosu (2000), CBIT is originally a technology of storing and retrieving knowledge or data on computers. Communication technology is a technology of both or either as a process (or transmission)by which a person sends a message (voice or data) to another upon whom it has an effect or as a negotiation and exchange or meaning. This is widely

known or separately evaluated as broadcasting or mass communication and telecommunication.

Volman and Van Eck (2001)opined that Computer-Based Information System is making a dramatic impact on the lives of people globally with the effect being most significant in education and organization as its provides access to a vast amount of information. Precisely, every point attests to the belief that the rate of progress will accelerate greatly over the next two decades. University of Ibadan and Ladoke Akintola University of Technology seem to have necessary facilities for this new technology. The potential improvement of power, cost and size of computer have been of great interest to these universities. However, Computer-Based Information System will offer opportunities for the improvement of Secretarial staff skills on their job performances, if effectively used.

Egbokhare (2007) enumerates the job description of a Secretarial Staff which include the following; preparing and supplying of information, drafting and preparing documents, maintaining a healthy, safe and effective working environment, excellent interpersonal skills relations and so on. However, the secretarial staff of University of Ibadan and Ladoke Akintola University of Technology in Nigeria is obviously aware of the kind of environment under which they operate. Academic environment demand, or requires intellectual input of a well-informed secretarial staff. Secretarial service is not for everybody but for those who have acquired the knowledge, skills, competencies and attitudes as well as the discipline to work late under pressure and handle emergencies.

According to Obiyan (2008), information technology is extremely important to the smooth operation of any organization. It affords secretarial staff of the Universities the opportunity to bridge the knowledge gap between them and their counterparts in other institutions. Accessibility of internet facilities assists secretarial staff in smooth running of their work which can lead to high job performance. Despite this, it is of pressing importance to find the significance of CBIT for an organization.

Methodology

The researcher employed the survey type of descriptive design. This survey was adoptable because it's concerned with studying part of the population that is generally large by selecting sample chosen from this population to collect data for systematic descriptive of existing situation. The population of the study comprises all the Secretarial Staff and the head of units of University of Ibadan and Ladoke Akintola University in Nigeria. The questionnaire is the main instrument that was used to elicit information from the respondents for this study.

A sample of 228 respondents were selected using stratified sampling technique consisting of 168 corresponding to 25% were of the total population secretarial staff in University of Ibadan while the remaining 60 corresponding to 25% were of secretarial staff in Ladoke Akintola University (25% were used across the board). Another set of 50 questionnaires were administered to all Head of units, department, centre, faculties and hall of residence in the two universities for the assessment of secretarial staff on job performance.

Results and Discussion

The data collected for the study were analysed using both descriptive and inferential statistics. The descriptive statistics that were used are frequency, counts, percentage, means and standard deviation, while the inferential statistics were include Pearson product moment correlation. The hypotheses were tested at 0.05 level of significance.

The results are presented in two stages. The first stage is the descriptive analysis in which general questions were answered while the second stage deals with testing of the hypotheses formulated.

Question 1: What is the level of job performance of Secretarial staff in the Universities in Oyo State?

This table used self-designed questionnaire on the staff job performance by their head of units using frequency, percentage and statistical package for Social science (SPPS version 20)

to analysed the data. The table generated the data by explained staff level of performance accessed by the head of the units in the institution under investigation.

Table 1: Level of Job performance of Secretarial Staff assessed by the Heads of Unit.

Level of Job Performance	**Head of Units** (Faculties, Dept., Centre, etc)	
	Frequency	Percentage
Low (0 – 49%)	55	24
Moderate (50 – 59%)	68	30
High (60% and above)	105	46
Total	228	100

T able 1 showed the levels of the usage of Computer based Management Information System assessed by the fifty Head of units, (department, faculties, centres and hall of residence)on the job performance of secretarial staff. It revealed that out of 228 secretarial staff sampled, 55 representing 24 had low level of the use of Computer based Management Information System. Moreover, 68 secretarial staff representing 30 percent had moderate level of the use of computer-based management information system while those that had high level of computer-based MIS were 105 representing 46 percent. The result revealed that the level of the use of Computer-based Management Information System on the job performance of secretarial staff in the two universities was high. Also, the Secretarial Staff of the two Universities have tendency of performing better on their job if they are expose more to the Computer-based Management Information System on their job performance.

Question 2: To what extent does Secretarial Staff in the Universities in Oyo State use Computer-Based Information Technology?

Questionnaires were designed on the use of CBIT and job performance of Secretarial Staff using frequency, percentage and SPSS to analyse the data.

Table 2: Usage of Computer-Based Information Technology

S/N	**ITEMS**	**Very Frequent**	**Frequent**	**Occasional**	**Never**	**Mean**
1	Computer System	95 (41 .7%)	1 21 (53.1 %)	6 (2.6%)	6 (2.6%)	3.46
2	Scanner machine facilities	45 (1 9.7%)	59 (25.9%)	1 06 (46.5%)	18 (7.9%)	2.43
3	Internet databases facilities	54 (1 9.7%)	42 (1 8.4%)	1 04 (45.6%)	28 (1 2.3%)	2.47
4	Application software	35 (1 5.4%)	27 (11.8%)	1 31 (57.5%)	35 (1 5.4%)	2.73
5	Telecommunication i.e. Intercom, bell phone, fax etc.	1 22 (53.5%)	54 (23.7%)	44 (1 9.3%)	8 (3.5%)	1 .73
6	Internet Connectivity	130 (57%)	42 (1 8.4%)	43 (1 8.9%)	13 (5.7%)	1 .73
7	Microsoft Outlook (etc. Diary)	133 (58.3%)	49 (21 .5%)	29 (1 2.7%)	17 (7.5%)	1 .69
8	Data-Based Mgt System Program (Oracle, visual basic) application packages	51 (22.4%)	68 (29.7%)	44 (1 9.3%)	65 (28.5%)	1 .61
9	Projector	112 (49.1 %)	57 (25%)	47 (20.6%)	12 (5.3%)	1 .83

T able 2 showed that 97.4% are those that use computer system either very frequently or occasionally, as against 2.6% of the secretarial staff that do not use computer system for their

day to day activities. This shows that the availability of computer system through the usage of CBMIS in these two universities is very high. It further shows that minor secretarial staff still uses traditional method i.e. typewriters to carry out their daily activities, as alternative to the use of computer system.

Table 2 also shows that 92.1 % are those that use scanner machine either very frequently, frequently or occasionally as against 7.9% that never use this facility. It shows that the use of this facility in these universities by the secretarial staff in carrying out their day to day activities seems to be paramount. It is so because there is no alternative for this facility, the penetration of CBMIS in these universities is very high.

Table 2 shows that 87.7% and 84.7% of the secretarial staff of these universities uses word processing, spread sheets, and Internet facilities either very frequently, frequently and occasionally as against 12.3% and 15.4% respectively who do not use these facilities for their day to day activities.

Table 2 also reveals that 71 .5% of the secretarial staff of the two universities use Databased Management System (Oracle) either very frequently, frequently or occasionally as against 28.5% who do not use these application package in carrying out their day to day activities. Data-based system software has no alternatives, hence the penetration of CBMIS in these two universities is high.

The above table also shows that 96.5% and 94.3% of the secretarial staff of these universities are those that use the telecommunication gadgets, WAN and LAN internet connectivity respectively as against 3.5% and 5.7% respectively that do not use these facilities to carry out their job. The preference for these facilities in their daily activities makes the penetration of CBMIS very high in these institutions

Furthermore, Table 2, reveals that 92.5% and 94.7% of the secretarial staff of the institutions use Microsoft Outlook intercom and projector respectively either very frequently, frequently or occasionally as against 7.5% and 5.3% respectively that do not use Microsoft outlook and projector machine by the secretarial staff of both universities. The penetration of CBMIS is very high.

The following are the results from the hypotheses tested:

Hypothesis 1: There is no significant relationship between the use of Computer-based MIS and job performance of secretarial staff. The result is presented in table 4.

Hypotheses were tested using Pearson product moment correlation finding the relationship that exists between the use of CBMIS and Job performance of Secretarial Staff.

Table 3: Summary of the use of Computer-Based IT and Job performance of Secretarial Staff using Pearson product moment correlation.

Variable	N	r-cal	r-tab
Use of CBMIS	228	0.384*	0.179
Job Performance	228		

P<0.05

(*) Means the hypothesis is significant at 0.05 level or Significant probability is less than 0.05.

Table 3 shows positive and moderate relationship between use of CBIT and Job performance of secretarial staff. The result obtained from the analysis shows that the value of r-calculated (0.384)was greater than r-table (0.1 79). This shows that the result was significant ($p<0.05$). Therefore, the null hypothesis was rejected. This means that there was significant relationship between the use of CBIT and Job performance of secretarial staff.

Hypothesis 2: There is no significant relationship between perceived relevance of Computer-based IT and job performance of secretarial staff. The result is presented on table 7.

Hypotheses were tested using Pearson product moment correlation finding the relationship that exists between the perceived relevance of CBIT and job performance of Secretarial Staff.

Table 4: Pearson product moment correlation of Perceived relevance of Computer-Based IT and Job performance of secretarial staff

Variable	N	r-cal	r-tab
Perceived relevance of CBMIS	228	0.281*	0.179
Job Performance	228		

P<0.05

(*) Means the hypothesis is significant at 0.05 level or significant probability is less than 0.05.

Table 4 showed positive and moderate relationship between perceived relevance of CBIT and job performance of secretarial staff. The result obtained from the analysis shows that the value of r-calculated (0.281)was greater than r-table (0.1 79). This shows that the result was significant (p<0.05). Therefore, the null hypothesis was rejected. This means that there was significant relationship between perceived relevance of Computer-Based IT and job performance of secretarial staff.

Furthermore, the results showed that positive relationship existed between the use of CBIT and Job performance of secretarial staff. This result was supported by the research of Aromolaran (2003)who reported that the use of CBIT has greatly enhanced the performance of secretarial staff. He further explained that the impact of Computer based information system on job performance of secretarial staff depends on the degree of technology or automation that is introduced with necessary facilities, the secretarial staff is less fatigue as the machines feeds itself, inspects its work, adjust it when the operation is unperfected and makes minor repairs.

Moreover, the study find out that positive relationships exist between perceived relevance of CBIT and job performance of secretarial staff. This is because as a result of changes in technology, the role of secretarial staff in administrative sector has changed tremendously from that of a manual typewriting and shorthand dictation, answering of telephone calls and processing of mails. This is corroborated by Edwin (2008) who opined that secretarial staff are exposed to office technology including the internet that make work much easier and knowledge more accessible. In another related study, Baker and Ward (2002) also opined that for secretarial staff to perform effectively and show positive impact on their jobs, the use of CBIT is unavoidably important. This is also supported by Tiamiyu (2000) who opined that the importance of the use of Computer based management information system by the secretarial staff improves productivity.

Conclusions and Recommendation

Based on the findings of the study, it was found that Secretarial staff depend on availability of facilities tools in relevance to Computer-Based Information Technology to improve their job performance. Therefore, the government, management and secretarial staff should be encouraged in the effective use of Computer-Based Information Technology in our tertiary institutions by exposing them to training and re-training on the use of CBIT which will tremendously improve their job performance.

To improve CBIT on the job performance of secretarial staff, more training and retraining should be organized often to all staff in the area of new technologies. Also study could also be carried out in other areas or institutions in Nigeria such as the Colleges of Education and Polytechnics to see whether similar findings would be made. Further research could be carried out on CBIT and job performance of teaching and other non-teaching staff in public Universities in South-West, Nigeria.

Contribution to the Global Development:

This study will be of added value to the community in assisting government in planning and solving some of the educational problems such as providing Computer-Based IS facilities into institutions and also, help educational planners and administrators to have adequate and

accurate data of students enrolment and school personnel. Computer-Based Information Technology will also help in proper planning with the full automation of the managerial system in the universities.

This research work would assist secretarial staff in keeping records such as computation of result and generating of transcript manually and give relevance information to the community. Hence it would help to improve staff productivity with greater efficiency and effectiveness through the train and retrain staff in learning new technological appliances. It would help the management of the Universities or any organization to invest by acquiring new technological, facilities or equipment to enhance job performance of staff. Students too would not be left out because there would be easy accessibility to their records.

References

[1.] Aromolaran, E. A. (2003). An Evaluation of the Continuous Relevance of Secretaries in the Automated Office. Business Education J. 4 (1): 63-70.

[2.] Baker A. and Ward C. (2002).'Bridging Temporal and Spatial 'Gaps'. The role of Information and Communication Technologies in defining communities'. Information communication and Society, 5(2), 24 – 27.

[3.] Bandele, S. O. 2006. Development of modern ICT and Internet System. In Agagu A. A. (ed). Information and Communication Technology and Computer Applications. Abuja: Pan of Press.

[4.] Edwin, A. E. (2008). Self-employment: An option for professional secretaries Nigeria. J. Contemporary Business Education Resources (JOCBER)1(1): 25-30.

[5.] Egbokhare, F. O. (2007). "Challenges of Secretarial Administration in a Globalizing World". A paper presented at the 15th national delegates assembly of the university Secretarial Staff Association: University of Calabar.

[6.] Egbokhare, F. O. (2007). "Challenges of Secretarial Administration in a Globalizing World". A paper presented at the 15th national delegates assembly of the university Secretarial Staff Association: University of Calabar.

[7.] Ehikhamenor F. A. (2002). 'Socio Economic Factors in the application of Information Communication Technologies in Nigerian Print Media'. Journal of the American society of Information Science and Technology 53:7. 602 – 603.

[8.] Gay, G., and Blades, R. 2005.. Information Technology for CXC CSEC, Oxford University Press, Oxford, UK. International Journal of Education and Development sing Information and Communication Technology (IJEDICT), 2006, Vol. 2, Issue 4, pp. 61 7.

[9.] Nwosu, B. O. (2001). Word Processing and Electronic Office Operations Competencies Currently Needed by Secretaries in Selected Business Offices in Abia and Imo States. Paper Presented at the 2001 National Conference Held at the Federal Polytechnic Idah, Kogi State, 27th November-1st December.

[10.] Obiyan, G. A. (2008). "Human Resource Development and Application of Information and Communication Technologies as Factors Affecting Sustainable Book Publishing in Nigeria: A Ph.D Post Field Seminar". Ibadan: University of Ibadan. Pp. 22 – 25.

[11.] Olatokun, M. &Tiamiyu, M. (2005). Information Science: Concepts, Model and Application – Disciplinary Scope and Orientation of Information Science. Pp 3 – 4.

[12.] Popoola, S. O. (2006). Information accessibility and Utilization as factors influencing decision making of managers in commercial banks in Nigeria. Library Herald, vol. 44(3)116-131

[13.] Tiamiyu, M. A. (2000). Information Technology in Nigeria Federal Agencies: Problems, impact and Strategies. Journal of Information Science, 26(4), 227-237.

[14.] Volman, M. and Van Eck, E. (2001). Gender Equity and Information

Software Security and Privacy Risks in Mobile e-Commerce

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Source

Ghosh A K, Swaminatha T. M, 2001, 'Software Security and Privacy Risk in Mobile E-commerce', Communications of the ACM, February, Vol. 44, No. 2, pp. 51-7, viewed 27 January 2015, https://www.cs.indiana.edu/~shiny/oral_qual/files/p51-ghosh.pdf.

Introduction

This review will analyse the article 'Software Security and Privacy Risk in Mobile E-commerce' in the online journal of Communications of the ACM. This review will first summarise the article. Secondly, it will look at the effectiveness of the article's structure, the arrangement of the information and reader ease of access.Thirdly, the review will critique the article, authority, accuracy, currency, objectivity and its relevance. The review will analyse the strategy presented by the author. The article was useful, clear and important

Review of Literature

Top security experts have written on this topic highlighting the need for application designers to consider user security while building and executing their applications. Mobile electronic commerce which is fast becoming the most convenient approach by users to transact their business without having to engage face to face with business owners are prone to the activities of cyber hackers. Recent publication have focused on encouraging a common platform that application designers will build on irrespective of the devices used and provide the necessary security intelligence to protect the users as they will feel more comfortable entering their personal data on their own wireless devices.

Article Summary

The purpose of the article is to provide the relevant principal areas to be considered to enable mobile e-commerce thrive. Owing to the vast prospects the sector will provide and the future of business transactions, it is imperative for the policy makers to understand the risks posed by wireless devices while accessing e-commerce applications. With the success recorded in desktop e-commerce system and the ability to reduce malicious attacks on e-commerce systems, the article highlighted the need for operators to use a common interface and build on strengthening it to ensure data security and reverence for privacy even as customers move from desktop e-commerce systems to mobile e-commerce systems. Mobile e-commerce systems will introduce new security and privacy risks beyond those currently found in desktop e-commerce systems. Encrypted communication protocols are necessary to provide confidentiality, integrity and authentication for mobile e-commerce applications.

Article Structure

The article in its introduction opened with expectations of wireless, internet enabled devices and how it perceived to be accepted by users for future business communication. The paragraphs in the body were short and concise containing 6 body heading with in depth information explaining the acts and mode of operation. As the article defined the research study conducted by the authors, the article contained real time strategies that will help to inform the reader. The authors highlighted the growth of the e-commerce business and how companies can leverage on the emerging market opportunities through limiting security flaws and privacy concerns for mobile users to carry out daily transaction with the assurance of the same even improved security enjoyed via the desktop.

The findings were explicit even in details and provided a fora for technology collaboration. The conclusion was short and contained the submission of the authors towards implementation of the standard best practices for continuous existence of business operations. References were identified with numbers which was easy to access. The article was logically developed, jargons were professionally explained which makes it easier for non-technical personnel understand the authors point of view. The article was presented in a PDF format preserving the formatting. Though no internal link in the body of the article, the authors were able to crystallize their opinions accurately.

Article critique

Authority

The journal, Communication of the ACM is the leading print and online publication for computing and information technology fields. Over 100,000 ACM members have access to its print magazine with in-depth coverage of emerging areas of computer science, new trends in information technology and practical applications. They have been providing platform to present and debate various technology implications, public policies, engineering challenges and market trends for over 50 years.

The authors are Information Technology Security Experts. Mr. Ghosh is Director of Security Research while Mr. Swaminatha is the software Security consultant both at Cigital Inc.at the time this article was published.

Accuracy

The source of the information in this article is fairly recent. It was supported with prevalent, recent reference list with these sources cited in text to support the research. The reporting and decisive processes contributed to the article's accuracy.

Currency

The journal was published in February 2001. The research it describes was current and the article cites up to date references in the body of the text (ranging from 1998-2000). Therefore, the article is current as at time of publication.

Relevance

This article on the ACM database and accessed by over 100,000 members worldwide will provide insight into current trends for Information Technology professionals. It would be relevant to key stakeholders interested in exploring the opportunities mobile e-commerce will offer. It could be difficult for entry level professionals not familiar with security and privacy risks for wireless internet enabled devices.

Objectivity

The information was factually presented. The article acknowledged that users of wireless devices can be difficult to trace because wireless devices roam in and out of wireless zones, having no fixed geographical point, and can go online and offline easily. Furthermore, without foundational security model, the severity of attacks against wireless devices will increase as these devices become more critical to users and businesses for both storage and processing of confidential information.

Stability

The article with its source on ACM database is stable as a resource and serve to inform technology leaders.

Analysis of graph/Image/Table

(Not Applicable)

Recent Advances Related to the Topic

Some of the recent advances on mobile ecommerce security includes fraud detection, application security, infrastructure protection, identity and access management as well as security intelligence and analytics. E-commerce applications overtime in its bid to earn the trust of users have implemented these security capabilities into their applications.

Conclusion

Mobile commerce itself present new risks, the nature of the medium requires a degree of trust and cooperation between nodes in networks that can be exploited by malicious entities to deny service and as well collect confidential information and disseminate false information. The best strategy for addressing security and privacy risks of internet-based content is to build security into the platform and applications themselves rather than attempt to introduce security patches afterward.

Reference

[1.] Arehart, C. and et al. *Professional WAP*. 1st edition, Wrox Press, 2000.

[2.] Balfanz, D. and Felten, E. Handheld computers can be better smartcards. In *Proceedings of the Eighth USENIX Security Symposium*,USENIX Association. (Aug. 1999, Washington, DC).

[3.] Cowan, C. et al. Buffer overflows: Attacks and defences for the vulnerability of the decade. In *Proceedings of the DARPA Information Survivability*

[4.] *Conference and Exposition (DISCEX 2000)*, (Jan. 2000, HiltonHead, SC), IEEE Computer Society, Los Alamitos, CA.

[5.] Cranor, L. F. Internet privacy: A public concern. *netWorker 2*, 3(June/July 1998), 13–18; www.acm.org/pubs/citations/journals/networker/1998-2-3/p13-cranor/.

[6.] Ghosh, A. K. *Security and Privacy for E-Business.* Wiley, NY (Jan. 2001).

[7.] Haskin, D. Analysts: Smart phones to lead e-commerce explosion. *all-Net Devices*(Nov. 3, 1999); www.allnetdevices.com/news/9911/991103ecomm/ 991103ecomm.html.

[8.] Lewis, T. Ubinet: The ubiquitous Internet will be wireless. *IEEE Computer32*, 10 (Oct. 1999).

[9.] Strategy Analytics. Strategy Analytics forecasts $200 billion mobilecommerce market by 2004. Wow.com, January 10, 2000; www.wowcom.com/newsline/press_release.cfm?press_id=862.

[10.] WAP Forum. Technical Reports WAP-193-WMLScript, WAP-170-WTAI, WAP-169-WTA. June–July 2000; www.wapforum.org.

[11.] Zhang, Y. and Lee, W. Intrusion detection in wireless ad-hoc networks.In *Proceedings of the ACM/IEEE MobiCom*, (Aug. 2000).

Homeland Security and Insurgency Management in North East Nigeria

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Abstract

Terrorism has become a global peril, and the North East Nigeria has got its own share of the insurgency by a dreaded Sect. Three states of North East Nigeria were the worst hit, leaving more than one million people comprising women and children displaced and homeless. However, on a daily basis, more people are displaced from their homes by the ruinous bombing which cause emergencies, and the emergency usually created, as a result, overwhelm the National Emergency Management Agency (NEMA) and other government agencies that take care of the Internally Displayed People (IDP). The planning and management of insurgency-related cases, though a government responsibility in Nigeria has a top-down approach which has not actually given prompt response during disasters and rescue to victims of the bomb attack. This article examines the role of a community-based Local Response Squad (LRS) when equipped with Information Technology (IT) infrastructure within the communities to assist in giving prompt responses to emergencies when it occurs. The LRS plan collaboratively for potential emergencies is also important to become more aware of local community-level values, planning, involvement and skill. This thesis also looks at the Human-Computer Interaction studies the interaction between people and computers to know how information technology affects insurgency management. The aim is to advance on emergency management resulting from insurgency through the plan of useful interfaces to technology. Conclusively, this article offers some implications for community insurgency management technology.

Introduction

The desecrated experience of insurgency and terrorist attack was new in Nigeria. A country of diverse religion and cultural differences co-existed for a century without experiencing the dreaded act of terrorism as witnessed in Middle-East. The North East States in Nigeria began to experience the act of suicide bombing and cruel butchery of innocent citizens by a dreaded sect in 2010, and it has continued till date. The women and children fall vulnerable to this bastardized act and more of them are displaced on a daily basis. The growing number of Internally Displaced People (IDP) as a result of this insurgency is overwhelming all emergency efforts made to rescue the victims.

Emergency management relating to insurgency involves the planning, reaction, resurgence, and alleviating the effects of human devastation that occur during the calamitous event. The Nigeria Emergency Management Agency (NEMA) were the actual federal government agency entrusted with the rescue and management of victims of insurgency; but other paramilitary agencies, and the Red Cross give helping hands in the exercise. The youth of the affected communities have also formed anti-terrorism and rescue squad called the 'Civilian JTF'. This community-based rescue team renders immediate assistant to victims before other governmental agency will arrive at the scene of bomb attack. The squad also engages in the search and fishing-out of suspected terrorists within the community and when caught, the suspects are handed over to the military JTF (Joint Task Force). The activities of the squad are usually neglected because the youths are not organized and they are not well trained in emergency management. Nevertheless, they give prompt response to emergencies and offer stringent security to terror prone communities.

The rationale to this article was to take a wider position on insurgency-related emergency management and look at the representation of community-based anti-terrorism groups and their use of information technology to enhance emergency work practices. This work is narrowed down to examining insurgency-related emergency management from the community perception. The idea is motivated by the understanding that the insurgency-related emergencies at the north-eastern states of Nigeria are local events, which happen in communities far from the military base. The equipping of community-based anti-terrorism squad with information technology will cushion the many of the glaring challenges and controversies in insurgency-related emergency management concerning the coordination of humanitarian relief across IDP camps and often from great distances from the scene of the emergency.

In a field study conducted to ascertain the preparedness of these anti-terrorist groups to combat the insurgency cases emanated from the activities of the dreaded sect, the youths were enthusiastic to fight the war themselves and give helping hands to their people when sudden bomb attacks occur. The youths testified that if equipped with sophisticated IT infrastructure, they can monitor and fish-out strange sect members within the community; detect and detonated locally made improvised explosive devices (IEDs) before it explodes; help in monitoring genuine internally displaced persons (IDPs) in the camp to thwart infiltration. On these trio findings, I shall base this article on the synergy between insurgency-related emergency management and the role of community-based local response squad (LRS) equipped with IT infrastructure.

Deploying information technology infrastructure to insurgency-related emergency management

Technology plays a dominating role in many aspects of insurgency-related emergency management, in particularly evident during disaster response. Nowadays we have a number of large information and communication technology infrastructure deployed to curtail larger scale disasters and manage the effects. The actual reason for deploying technology in emergency management is to detect improvised explosive devices (IEDs) before it explodes, connect, inform and finally save the lives of those impacted by disasters. Information Technology infrastructure restores connectivity to impacted areas so that governments can communicate with the affected citizens and the people can find their relations. IT infrastructure enables NEMA and other responders to coordinate rescue missions and work efficiently from the minute they arrive in a disaster zone, and helps businesses recover so communities can begin to rebuild faster. Moreover, after and in between attacks, technology helps us analyze, track and study insurgency-related disasters so that we can always be learning and developing better technological infrastructure and prepare to save more lives.

Going by the three key points deduced from the field study conducted in a North East community of Nigeria, where the youths testified that IT infrastructure would assist them in insurgency-related disaster management -: monitoring and fish-out strange sect members, detecting and detonating locally made improvised explosive device (IED), and giving a helping hand in monitoring genuine internally displaced persons, we shall elaborate the role of deploying IT infrastructure to each of the points mentioned above in emergency management.

Deploying public safety camera surveillance in insurgency-prone communities

Today, government and public agencies are taking safety measures and increasingly deploying cameras of all types to improve internal and external security. Secondly, expansion of video also reflects agencies' interest in proactive policing and using analytics to improve community safety. The use of cameras mounted at strategic places within the insurgency-prone communities will help monitor the movement of people within the areas to checkmate the sect's activities. The deployment of cameras of all types for surveillance, including body-

worn cameras, dashboard cameras, license-plate readers, fixed surveillance cameras and drones will Increased scrutiny and detect where the improvised explosive devices (IEDs) are produced locally and a halt to the production will be made by the law enforcement agencies. The deployment and use of these surveillance cameras go with enormous task of expertise, availability of power, storage and adequate security. Notwithstanding many advantages of the installation of video, the volume of files generated by more cameras pose a terrific challenge to IT departments for managing storage capacity. For instance, it takes about 600 body cameras deployed to generate 7 terabytes (TB) of video per month. In other words, it is approximated that 1 TB of data is roughly equivalent to 500 movies. Also about 11 body-worn cameras deployed generates close to 10,000 videos per month. These volumes of storage may seem high, but they are easy to reach even if body cameras only record movement at worship centres in North east states of Nigeria which is the major target of insurgency attacks in recent times.

The following points shall be noted in determining camera installation at public places.

- The type of camera to be installed at any given place shall be determined when a detailed evaluation of operational needs, community expectations and budget are considered to create a more suitable plan for which types of cameras should be used and where.
- The video files can be stored using the cloud services taking cognizance that the volume and size of body camera and other new types of video files will exceed internal storage resources of any IT department.
- The video security and integrity will be protected so that video files can be admitted as evidence during prosecution of insurgency culprits, criminals, and other civil cases. Adequate measures shall be put in place to maintain appropriate chain of custody as well as cybersecurity protection against inappropriate video access, modification, forwarding, deletion, copying or public release.
- It is very important to establish what type of access controls need to be in place so that video files can only be made available to authorized IT administrators. The video storage access method shall support external users in other agencies.

It is certain that video camera project will involve capital budgets for the initial purchase of cameras and batteries, a video management system, servers and storage systems if video files will be stored on-premises. Constant operational costs will include program management, camera replacement and increased storage capacity, whether on-premises or in the cloud. The Local Response Squad (LRS) when established within the troubled communities can be trained to use these cameras due to their familiarity with the terrain of the environment. Besides Soldiers and other law enforcement agencies within the community attract attention and therefore pose threat to terrorist who shade from their presence and commit their nefarious act taking the other way. The military will have the base station of all the cameras and monitor all activities of the LRS to checkmate nefarious tricks of infiltrators.

Detecting and detonating locally made improvised explosive devices (IEDs)

The improvised explosive devices (IEDs) which insurgents and terrorists use in North East Nigeria to attack their perceived enemies come from a coordinated activities such as financing, obtaining supplies, making IEDs, planting and detonating them. The IEDs used were usually manufactured within the community because the devices are so trigger ready to be carried to a long distance. Therefore, defeating these IED must involve a combined strategy of understanding and observing the enemy’s tricks and makeup. Counter-terrorists law enforcement personnel and the LRS have to be trained to be aware of the enemy's behaviors, to look for indicators of IEDs within the terror-prone communities and to use technology to dispose or disable them. The coordinated strategy to defeat the IEDs includes the following measures:

- Gathering data concerning enemy activities that might indicate imminent IED attacks. This involve observing suspicious activities of people within the community using the

surveillance cameras mounted at strategic places to tracing or disrupting the movements of supplies of the raw materials for IED production and money.

- Detecting the IEDs using IT-based gargets.
- Disposing of or disabling the detected IED
- Protecting citizens from a detected IED

The community-based LRS should be trained to be suspicious of unattended packages along a road, fence, building or even a trash pile because IEDs are easy to hide in unsuspected places. After the training, the LRS shall be equipped with some new technologies which are capable of detecting, disrupting or disabling IEDs. These technologies are designed to place a "bubble" of protection around the community. For instance, many combat vehicles are now equipped with **radio frequency jamming devices**, which disrupt the cell phone signals often used to trigger IEDs. The Neutralizing Improvised Explosive Devices **(NIRF)** with radio frequency is another device that emits a high frequency radio pulse that deactivates IED electronics within a short distance. Another detecting device is the **Microwave-pulsing devices** which can be used to "fry" the electronics of IEDs. The **LIBS** (laser-induced breakdown spectroscopy) uses lasers to detect IED explosives within a 100-foot (30-meter) radius. The community-based LRS can be equipped with some of these devices to monitor, detect and detonate IEDs before the terrorist use them to carry out their nefarious activities.

Simple Anatomy of an IED

IEDs are homemade with five basic parts: [source: GlobalSecurity.org].

1. A power supply, often provided by car batteries or alkaline flashlight batteries
2. A trigger, switch or some other direct or indirect means of setting the device off, such as a radio signal, trip wire, timer or firing button that someone presses. A common form of remote trigger is a cell phone, cordless phone, radio or garage door opener activated by someone who is watching
3. A detonator, a small explosive charge that sets off the main charge. Detonators are usually electrical, like those used for explosions in construction.
4. A main charge, the primary explosive that's the big guns behind the blast. Unexploded landmines fit the bill.
5. A container to hold everything together. The container may be designed to force the blast in a specific direction.

Additional components packed in the device may include projectiles for shrapnel, such as ball bearings, nails and stones, as well as hazardous, toxic or fire-starting chemicals. IEDs may also be used as the explosive part of a biological or radioactive dirty bomb.

Let's look at how these parts work together: [source: GlobalSecurity.org].

1. The power source supplies electricity to the trigger or switch and to the detonator.
2. The trigger activates the detonator and initiates the explosion sequence. The trigger may sense the target, be activated by the target, be a timed trigger or be operated remotely.
3. The detonator explodes, thereby providing energy for the main explosive.
4. The main charge explodes, producing a high-pressure shock wave or blast wave, and may propel shrapnel, toxic chemicals or fire-starting chemicals.

The worrying part is that IEDs are relatively simple to make with a little research, time and training. After all, how hard is it to get batteries, cell phones and radios. Detonators and explosives such as C-4, Semtex and dynamite can be found at construction sites, oil rigs, and makeshift labs or purchased in terror-patronized black markets. Terrorist groups have been known to post recipes on their web sites which they know how to source materials. IEDs have several ways to explode which include -Package Type IED; - Vehicle-Borne IEDs (VBIEDs); - Suicide Bomb IED.

Suicide Bombs

The suicide bombing and vehicle-borne are the most widely used IEDs by terrorists in North East Nigeria due to the availability of vulnerable children that are hypnotize to carry out this barbaric acts. A suicide bomber brings a singularly difficult threat for communities. The main aim of the terrorist is not to commit suicide, but to kill or injure as many perceived enemies and innocent civilians as possible. A "person-borne" suicide bomb usually employs a high-explosive/fragmentary effect and uses a command detonation firing system, some sort of switch or button the person activates by hand. Some explosives with fragmentation can be contained in a vest, belt, or clothing that is specifically modified to carry this material concealed. The vehicle-borne suicide bombs employ the same methods and characteristics of other package or vehicle bombs using a command detonation firing system.

Response to Disasters and Monitoring Internally Displaced Persons (IDPs)

The method of our respond after a natural disaster is crucial, whether within the first few minutes of occurrence or the months of rebuilding that follow. However, the best disaster response begins before a disaster happens. As part of disaster preparedness, going by past experiences, building on solutions that worked and growing network of partnerships so that all the responders will get what they need when disasters happen. Rather than viewing disaster response as everyone trying to individually have complete of what they need ready to go for themselves, we should think of neighbors helping neighbors, sharing resources and being empowered to be first responders for each other. Highlighting community-based response is a key way to scale disaster response and preparedness to a backyard level, and communities should work together with emergency managers to jointly build resiliency before disaster strikes.

Solutions to obtaining information faster and distribute to organizations at the right point in time

The Red Cross made this statement in its World Disasters Report: “When disaster strikes, access to information is just as important as food and water and is an increasing critical need”. The best solutions is the development of emergency.lu, a satellite that can be rapidly deployed to a disaster zone within hours in order to bring high-quality Internet connectivity and low-bandwidth versions of Skype and Lync to areas where regular Internet connections have been downed. This satellite has been used successfully in disaster prone areas during Typhoon Haiyan, as well as by the World Food Programme in humanitarian situations such as the food crises in Sudan and Mali. Greater volumes of data are generated and collected during disaster response and a greater opportunity for research, analysis and visionary ways to build upon key lessons learned.

Monitoring internally displaced persons (IDPs)

The LRS will increasingly be able to collect and extract more detailed assessments, which can proactively act before the next disaster when the IT infrastructure is provided. Working with the military and other emergency management agencies to build effective and collaborative ways to mine data, including social media, both during disasters and afterward is an important focus for this project. The LRS shall be in a better position to monitor the camp of internally displaced persons (IDPs) from infiltrators due to their familiarity of the terrain.

The future development of information and insurgency management

With the deployment of this technology for progressive, real-time open sharing of data during disasters, we look ahead to see a shift and rewiring of how insurgency-related disaster response is managed. Today with sophisticated camera phones, situation reports that could come a day later, can now be delivered promptly and a variety of data sources we rely upon to make critical decisions. I foresee the future of insurgency-related disaster response where

camera phone will be integrated to monitor insurgents by every Nigerian. In the same way, that there will be a transformation in the technique organizations exchange critical data in an open and real-time manner in Nigeria to make it available to people who need it to take prompt action.

Conclusion

Our aim in this research was to bring to light a synergy between the conventional disaster management agencies and a community-based local response squad (LRS) in response to insurgency-related disaster management when equipped with information technology infrastructure. Amidst what citizens in the various case studies were experiencing, the people when leveraged with IT infrastructure would checkmate insurgents and bring rapid succor to their kiths and kin whenever emergencies occur. The LRS when formed is more familiar with their environment and stand better chances to trace miscreants among them; detect and detonate improvised explosive devices (IEDs), and give a round the clock surveillance to their people because the military come to the communities only when insurgents strike. As technologies is accessible globally, their usefulness during both normal situations and disaster period will continue to increase, and it is very important that we design technologies catered to people who live in this disaster prone area of North East Nigeria.

References

[1.] Bardram, J. E. Plans as Situated Action: An Activity Theory Approach to Workflow Systems. In Proc. of the Fifth European Conference on Computer Supported Cooperative Work, 1997.

[2.] Brewer, I. and McNeese, M.D. Supporting Work in Hurricane Management Centers: An Application of Cognitive Systems Engineering Techniques. In Proc. of the Human Factors and Ergonomics Society 48th Annual Meeting, 2004, 2426-2430.

[3.] Brewer, I. Understanding Work with Geospatial Information in Emergency Management: A Cognitive Systems Engineering Approach in GIScience. Ph.D. Dissertation, The Pennsylvania State University, University Park, PA, 2004.

[4.] Cutter, S. L GI Science, Disasters, and Emergency Management. Transactions in GIS 7, 4(2003), 439-445.

[5.] Government Technology, "Body Worn Camera Data Storage: The Gorilla in the Room," http://www.govtech.com/dc/articles/Body-Worn-Camera-Data-Storage-The-Gorilla-in-the-Room.html

[6.] Government Technology, "Body Worn Camera Data Storage: The Gorilla in the Room," http://www.govtech.com/dc/articles/Body-Worn-Camera-Data-Storage-The-Gorilla-in-the-Room.html

[7.] Gurstein, M. Community Informatics: Current Status and Future Prospects - Some Thoughts', Community Technology Review, Winter-Spring 2002, Available online: http://www.comtechreview.org/winter-spring-2002/000056.html.

[8.] Haddow, G. D. and Bullock, J.A. Introduction to Emergency Management. Butterworth-Heinemann, Amsterdam, 2003.

[9.] J. Steinfeld and J. Wormhoudt, "Explosives Detection: A Challenge for Physical Chemistry," Ann. Rev. Phys. Chem., vol. 49, 1998, pp. 203–232.

[10.] Jian, X., Chen, N.C., Hong, J.I., Wang, K., Takayama, L., and Landay, J. A. SIREN: Context-Aware Computing for Firefighting. In Proc. of The Second International Conference on Pervasive Computing, 2004, 87-105.

[11.] Jian, X., Hong, J. I., Takayama, L.A., and Landay, J.A. Ubiquitous Computing for Firefighters: Field Studies and Prototypes of Large Displays for Incident Command. In Proc. CHI 2004, ACM Press (2004), 679-686.

[12.] Johnson, C. W. Applying the Lessons of the Attack on the World Trace Center, 11th September 2001, to the Design and Use of Interactive Evacuation Simulations. In Proc CHI 2005, ACM Press (2005), 651-660.

[13.] Jones, A. C. The Information-Technology-People Abstraction Hierarchy: A Tool for Complex Information System Design. Masters Thesis, The Pennsylvania State University, University Park, PA, 2004.

[14.] Jones, R. E. T., McNeese, M.D., Connors, E. S., Jefferson, T., and Hall, D.L. A Distributed Cognition Simulation Involving Homeland Security and Defense: The Development of Neo CITIES'. In Proc. of the Human Factors and Ergonomics Society 48th Annual Meeting, 2004, 631-634.

[15.] Journal for IED by Charles M. Wynn, Stephen Palmacci, Roderick R. Kunz, and Mordechai Rothschild https://www.ll.mit.edu/publications/journal/pdf/vol17_no2/17_2_1Wynn.pdf

[16.] Mayer-Schönberger, V. Emergency Communications: The Quest for Interoperability in the United States and Europe. International Journal of Communications Law and Policy, Issue 7, Winter 2002/2003.

[17.] McKinsey and Company. Increasing FDNY's Preparedness. 2002. Available online: http://www.nyc.gov/html/fdny/html/mck_report/toc.html

[18.] National Commission on Terrorist Attacks. The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States. W.W Norton and Company, New York and London, 2004.

[19.] National Research Council, Existing and Potential Standoff Explosives Detection Techniques (The National Academies Press, Washington, D.C., 2004).

[20.] PC Ninja, "How much can a 1 TB external hard drive hold?" http://www.pcninja.us/how-much-can-a-1-tb-external-hard-drive-hold/

[21.] Pettersson, M., Randall, D., and Helgeson, B. Ambiguities, Awareness, and Economy: A Study of Emergency Service Work, Computer Supported Cooperative Work, 13, 2004, 125-154.

[22.] Quarantelli, E. L. A Half Century of Social Science Disaster Research: Selected Major Findings and Their Applicability. Preliminary Paper# 336, Disaster Research Center. Available online: http://dspace.udel.edu:8080/dspace/handle/19716/297.

[23.] Rauscher, I., Agrawal, P., Fuhrmann, S., Brewer, I., Wang, H., Sharma, R., Cai, G., and MacEachren, A. Designing a Human-Centered, Multimodal GIS Interface to Support Emergency Management. In Proc. of ACM Symposium on Advances in Geographic Information Systems, 2002, 119-124.

[24.] Schafer, W. A., Ganoe, C. H., and Carroll, J.M. Supporting Community Emergency Management Planning through a Geocollaboration Software Architecture. Computer Supported Cooperative Work: The Journal of Collaborative Computing, 16(4-5), 2007, 501-537.

[25.] Sharma, R., Yeasin, M., Krahnstoever, N., Rauschert, I., Cai, C., Brewer, I, MacEachren, A., Sengupta, K. Speech-Gesture Driven Multimodal Interfaces for Crisis Management. In Proc. of the IEEE, 91(9), 2003, 1327-1354.

[26.] Star, S. L. and Strauss, A. Layers of Silence, Arenas of Voice: The Ecology of Visible and Invisible Work. Computer Supported Cooperative Work, 8, 1999, 9-30.

[27.] Suchman, L.A. Plans and Situated Actions: The Problem of Human-Machine Communication, Cambridge University Press, Cambridge, UK, 1987.

[28.] Terrell, I. S., McNeese, M.D., & Jefferson, T. Exploring Cognitive Work Within a 911 Dispatch Center: Using Complementary Knowledge Elicitation Techniques. In Proc. of the Human Factors and Ergonomics Society 48th Annual Meeting, 2004, 605-609.

[29.] Turoff, M., Chumer, M., Van de Walle, B., and Yao, X. The Design of a Dynamic Emergency Response Management Information System (DERMIS). Journal of Information Technology Theory and Application, 5(4), 2004, 1-35

Agribusiness as an Unlocking Opportunity for Youth Livelihood Development

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Abstract

This study explored the role of agribusiness opportunities in youth-led livelihood development activities. The objectives of the study are, to identify the significance of agribusiness' role in youth livelihood development, to understand the potentialities of agribusiness for employment generation and to identify the barriers of the sector in Sierra Leone. Primary data were collected through structured questionnaire and semi-structured interviews. The study has shown that agribusiness has a great potential in diversifying employment opportunities for the youth. Its contribution for food security and the well-being of the community through livelihoods development is magnificent. The study further revealed as the sector is also not free from different challenges like shortage of improved agricultural technology, loose connection across the different stages of the value chain, mind-set of youth to go for agricultural activities and the weak linkage between agricultural productions with the markets. However, to fully realize the capacity of agribusiness in livelihoods development there needs to have a proper understanding of the market and value chain development. In addition to this, there is a need to build up the role of the private sector and support a more plural and strong enabling environment to enable a broader scale uptake of productive market focused approaches.

Key Words: Agribusiness, livelihood, youth, market, value chain.

Introduction

Sierra Leone is located on the west coast of Africa between 60 55' N and 10 000' N (Asamoahi, 2012). The country covers a total land area of 72 325 km2. Nearly 75% of the total land area is arable. Sierra Leone is well endowed with a wealth of natural resources. The agricultural sector, comprising food crops, tree crops, fishery, livestock, and forestry sub-sectors is the backbone of the country's economy. Nearly two-third of the population depends on the agriculture sector for its livelihood. Most farmers produce a wide range of rain-fed food and tree crops, predominantly using the slash-and-burn or shifting cultivation farming system (Braima *et al*., 2006; SSL, 2007; SSL, 2009 cited in Asamoahi, 2012).

Agriculture, including fisheries and forestry is contributing about 46 percent of the GDP in Sierra Leone and providing employment opportunities for about 75% of the population. The crops sub-sector is predominant followed by fisheries (FAO and UNDP, 2013).

The livestock sub-sector is insignificant and underdeveloped. Sierra Leone has abundant water resources, with huge growth potentials in the fisheries sector. There are nine major rivers with catchment areas varying from 720 km2 (Peninsular) to 14,140 km2 (Sewa). The fishery industry consists of artisanal, industrial and inland fisheries, and aquaculture. Artisanal fisheries operate in estuaries and coastal waters extending from the shoreline to a depth of 15-45 m. It is a significant source of employment, income source for the rural communities, and the largest single source of protein for the majority of Sierra Leoneans. Industrial fisheries operate in the open deep waters and are highly capital intensive and foreign-dominated, but constitute the mainstay for revenue generation from fisheries (Asamoahi, 2012).

Table 1. Arable land distribution in Sierra Leone Ecology

Ecology	Ecosystem	Area (1000 ha)	Percent of arable land	Percent of Total land area
Upland	Upland	4 200	78	58
Lowland	Inland Valley Swamp	690	13	10
	Mangrove Swamp	200	4	3
	Bolilands	145	3	2
	Riverine grasslands	130	2	2
	Arable Land	5 365	100	75
	Non Arable Land	1 870		25
	Grand total	100		7 235

Source: Alieu, 2005 cited in Asamoahi, 2012

Sierra Leone has gone through a ten-year civil conflict which brought considerable destruction, especially in that very vital sector that controls the lives of the people of this country, viz, agriculture. A good percentage of the population, before the war, was composed of young men and women who provided the labour force for activities on the farms. These youths (15-35 years of age) have undergone serious transformations as a result of the civil conflict. Most of them have got themselves completely disoriented. They have found it difficult to cope with life situations since the war ended. Agribusiness has been identified as the best alternative for them as they very much have comparative advantage considering agriculture as the best option since the country has an immense natural resources. There are however serious challenges in this attempt. Problems to be faced in enticing them to go back to their villages and engage in agribusiness may lie with decisions on which type of farming activities to engage in, how they can get the required inputs to engage in the activities they like, how they can receive requisite training in the activities to be undertaken, etc. which requires development actors to work out the modalities for them to go back to their villages and to take agribusiness as an alternative to their life (NAYCOM, 2013).

Objective

The objectives of the study are, to identify the significance of agribusiness' role in youth livelihood development, to understand the potentialities of agribusiness for employment generation and to identify the barriers of the sector in Sierra Leone.

Methodology

The study used qualitative research techniques of data collection. The research undertook a comprehensive search for available literature, including reports and action plans on agribusiness development. Semi-structured interviews and questionnaires were held with different officials working in the sector to solicit their views on agribusiness development challenges and potentials in creating employment opportunities for youth. Focus group discussions were also held with youth to capture their views on the sector. A total of 23 professionals and 52 youth have participated in the data collection process.

Based on the type of methods used to collect the data, the information was analyzed through qualitative research analysis methods. The primary information collected through interview, observation and questionnaires was separately transcribed which helped the raw data to be ready for scientific analysis. Then content analysis of the information was made and main points were analyzed (Roulston, 2001; Boeije, 2010; Flick *et al*., 2004).

Results and Discussion

From time immemorial farmers have made decisions on what they should grow and at harvesting stages on what they should keep for home consumption and what they are able to sell at the marketplace. In former times sales would have centered on local markets and it

would have been rare for a farmer to venture far a field in search of new market opportunities or to consider developing new, higher value products. This traditional form of agriculture started to change as communities and nations begin to modernize and have a better understanding of economic returns from the agricultural produces. Through processes of urbanization generally fostered by industrialization demand for food from urban dwellers becomes dependent upon ever more sophisticated arrangement of actors involved with aggregation of farm produce, transportation, storage, wholesaling, processing, and retailing. As cities expand, food supply systems develop into increasingly longer market chains with clear divisions according to product type and market segmentation (Mark *et al*., 2004).

In many parts of the world, agriculture continues to play a central role in economic development and to be a key contributor of efforts in poverty reduction. However, agriculture alone will not be sufficient to address the poverty and inequality that are so pervasive in today's world. Traditionally, little attention has been paid to the value chains by which agricultural products reach final consumers and to the intrinsic potential of such chains to generate value added products as well as employment opportunities (UNIDO, 2009).

The agricultural sector is an engine for growth of employment in Sierra Leone. The country is endowed with favorable climatic conditions, several agro-ecological regions suitable for production of various crops, and abundant water resources. However, only 10% of the cultivable land is cropped every year (GoSL, 2012).

In Sierra Leone, there is enough land, and it is sufficiently fertile; neither topography nor climate can be blamed for the agricultural impasse. Small-scale agriculture is currently not profitable in Sierra Leone. Young people in particular who should guarantee and improve its future express reluctance to do this 'slave's work', to 'suffer under the hot sun', 'without harvesting enough to fill the stomach before going to sleep'1 (Laurent and Michael, 2011). This is attributed due to several factors. Poor agricultural technology transfer, linkage between agribusiness and research, market information management, poor infrastructure, capacity development and agribusiness technical assistance, local and regional market opportunities, etc. are among the predominant factors which down sized the potential of agribusiness in creating livelihood opportunities for the youth in particular and the community in general. This in turn is making the sector to be a less attractive and less profitable business for youth.

1 Statements (verbatim) made by young men in informal talks during research in northern Sierra Leone.

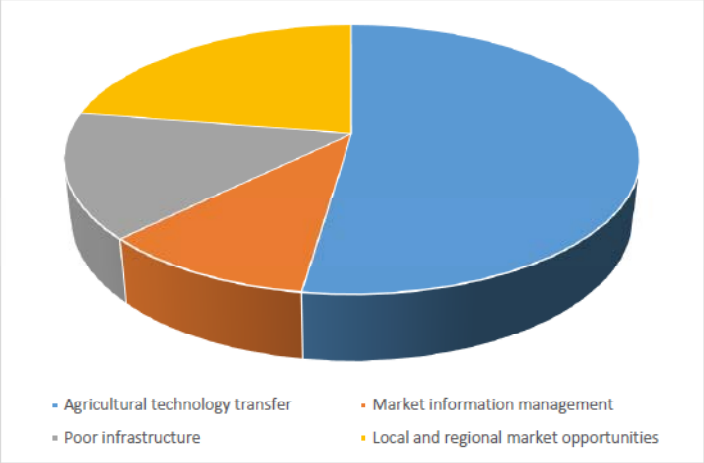

Fig. 1: Analysis on the magnitude of factors affecting agribusiness

Given the natural resources potential of the country to make use of agribusiness development, different strategies can help the sector to create livelihood opportunities. Amongst, diversification of the outputs of the producers can enable them benefit from high value market opportunities as well support low value staple food systems and thus take

advantage of market opportunities profitably. Capacity development of development actors within a defined project territory will also help to support agro-enterprises and facilitate farmers gain access to local business support services like mentorship and coaching. Value addition on produces through proper packaging, pre and post-harvest handling techniques, grading and branding will also play in increasing the profitability of the sector. Establishment of a system whereby assistance in business plan development, market information management, coaching and mentoring services to businesses, linking the young agribusiness entrepreneurs to financial institutions, business and financial management skills provision will also play a predominant role in making the sector more profitable and attractive to the youth.

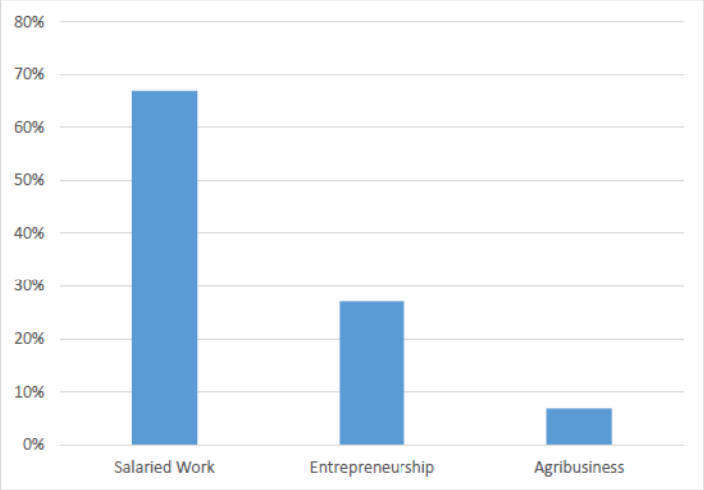

Fig. 2: Analysis of respondents' preference on employment opportunities

Creation of the enabling environment which fits into the Small and Medium Enterprises (SME) mould, is particularly relevant to realizing the potential of the private sector for responding to agro-based market opportunities as part of the process of the economic transformation. The intensification of SME activities in the agricultural sector (value-chain and export-oriented agribusiness and agro-industries) will impact the lives of many in the rural areas who are engaged in low-productivity subsistence and traditional smallholder production.

The realization of the potential of the private sector for employment promotion will require public sector interventions to create an enabling policy environment and to provide a favourable business climate, including physical infrastructure and business support services such as cooperatives. In this regard, Public Private Partnerships (PPPs) can play a vital role with respect to investment in vital public infrastructure to offer the kind of risk-adjusted returns required by private entrepreneurs. The use of PPPs, for example, to provide rural infrastructure using employment-intensive methods would create short-term employment for rural youth and, more importantly, address structural problems of low productivity, inadequate roads and poorly integrated internal markets which are serious constraints on the development of agribusiness and agro-industry and on entry into global supply chains. This type of intervention fits in with the model of a short term employment programme for immediate action complemented by a medium-to long-term strategy that aims, inter alia, to increase the employment content of economic growth in the wider development process (MLSS and MYES, 2011).

Conclusion

Agribusiness provides opportunities for those with inadequate assets and business skills to improve their livelihoods and income sources. Agribusiness is therefore among the forefront initiatives which can help to create livelihoods opportunities for youth. Improving the

productivity of the land resources by strengthening their economic integration through well-functioning markets are essential elements of it. Agricultural products processing, value addition, marketing products, credit services and rural infrastructure development will also help to make the best out of agribusiness initiatives.

References

[1.] Asamoah Larbi, 2012: Country Pasture/Forage Resource Profiles, Sierra Leone. Food and Agriculture Organization of the United Nations.

[2.] Boeije Hennie, 2010: Analysis in qualitative research (1st ed.). Los Angeles: SAGE.

[3.] FAO, IFAD and WFP, 2015. The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. Rome, FAO.

[4.] FAO and UNDP, 2012: Enhancing Youth Employment through Agribusiness. Freetown, Sierra Leone.

[5.] Flick, U., Kardorff, E., and Steinke, I., 2004: A companion to qualitative research (1st ed.). London: Sage Publications.

[6.] GoSL (Government of Sierra Leone), 2008: Youth Agenda for Development. National Youth Commission, National Stadium Swimming Pool, Brookfields, Freetown.

[7.] GoSL (Government of Sierra Leone), 2003: Sierra Leone National Youth Policy, Freetown, Sierra Leone.

[8.] Laurent E. Cartier and Michael Burge, 2011: Agriculture and Artisanal Mining in Sierra Leone: Alternatives or Complements? Journal of International Development. J. Int. Dev. 23, 1080–1099 (2011). Published online in Wiley Online Library.

[9.] Mark Lundy et al., 2004: Increasing the Competitiveness of Market chains for Smallholder Producers. Manual 3: Territorial Approach to Rural Agro-enterprise Development. Rural Agro-enterprise Development Project. CIAT, Costa Rica.

[10.] MLSS and MYES (Ministry of Labour and Social Security and Ministry of Youth Employment and Sports (MYES), 2011: National Employment Policy: Combining Employment Creation with Economic Growth, Structural Transformation and Social Development. Freetown, Sierra Leone.

[11.] NAYCOM, 2013: Agribusiness and Rural Entrepreneurship Development for Youth Employment in Sierra Leone. Project Document. Freetown, Sierra Leone.

[12.] Roulston Kathryn, 2001: Data analysis and 'theorizing as ideology'. London Thousand Oaks, CA and New Delhi). 1(3): 279-302.

[13.] UNIDO (United Nations Industrial Development Organization), 2009: Agro-value Chain Analysis and Development. The UNIDO Approach. A staff working paper Vienna.

Evaluation of Anti-oxidant Activity and cytotoxicity of *Strobilanthes cuspidata* (Benth.) T. Anderson

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Abstract

Strobilanthes cuspidata (Benth.) Anderson (Acanthaceae) are used by the tribal people of Nilgiri hills for joint pain and inflammation. A detailed study on the natural products present in endemic medicinal plants as well as pharmacological aspects will pave way to discover new drugs. Hence the present study was attempted to assess the biological activities of the crude extracts by antioxidant and cytotoxic assays. The 70% hydro-ethanolic extract of S. cuspidata was prepared to study DPPH radical scavenging activity, hydrogen peroxide scavenging activity, metal chelating activity, total antioxidant activity and in vitro cytotoxicity was assessed in Vero cell lines (African, Green monkey Kidney and Normal). The results showed that the plant extract of S. cuspidata possesses antioxidant and free radical scavenging properties. Moreover in vitro cytotoxic activity of the alcoholic leaf extract was assessed in Vero cell lines (African, Green monkey Kidney, normal). The percentage of growth inhibition was calculated using the concentration of the leaf extract to inhibit the cell growth by 50% (CTC50). The study revealed that the activities observed could be attributed to the presence of some phytochemicals which have been associated with antioxidant and cytotoxic property.

Keywords *- Strobilanthes cuspidata, antioxidant, cytotoxicity, DPPH, Vero cell lines.*

Introduction

The natural antioxidants are gaining a vast importance due to their fewer side effects. Oxygen free radicals induce damage due to peroxidation to biomembranes and also to DNA, which lead to tissue damage, thus cause occurrence of a number of diseases. Antioxidants may be synthetic or natural. Synthetic antioxidants such as butylated hydroxytoluene (BHT) and butylated hydroxyl anisole (BHA) have recently been reported to be dangerous for human health. Thus the search for effective, non toxic natural compounds with antioxidative activity have been intensified in recent years, (Vivek *et al*., 2006). An antioxidant when present at low concentrations delays or prevents oxidation of cell content like proteins, lipids, carbohydrates and DNA. Plants can provide drugs to widen the therapeutic arsenal. Traditional systems of medicine have become increasingly important in view of their safety and for this reason, the realization of health hazards and toxicity associated with the indiscriminate use of synthetic drugs and antibiotics and research is carried out in order to determine the toxicity of medicinal plants, (Nguta *et al*., 2012).

Material and methods

Preparation of the test solutions

The plant extract (210 µl) was made up to 1 ml using DMSO. The solution was serially diluted to obtain lower concentrations (1000, 500, 250 and 125).

Preparation of standard solution

Rutin (10 mg) was weighed separately and dissolved in 0.95 ml of DMSO and serially diluted with the same to attain lower concentrations (1000,500, 250 and 125).

a) ***DPPH radical scavenging activity***

Scavenging activity on the DPPH free radicals by the test solution was assessed according to Sanchenz-Moreno. (2002).The principle of this assay is based on the scavenging ability of antioxidants towards the stable radical (DPPH). The assay was carried out in a 96 well micro titre plate. To 200 µl of DPPH solution (100 µM), 10µl of each of the test sample were added. The plates were incubated at 37 ºC for 20 minutes and the absorbance of each solution was measured at 490 nm using ELISA reader. The activity % DPPH scavenging was calculated according to the following equation:

% Inhibition = $\{(A_B - A_A) / A_B\} \times 100$,

where A_B is the absorbance of blank sample and A_A the absorption of test sample.

b) ***Hydrogen Peroxide assay***

The hydrogen peroxide scavenging activity of the test solution was determined by the method of Ruch *et al*. (1989). The test solution was dissolved in 3.4 ml of 0.1 M phosphate buffer (pH-7.4) and mixed with 600µl of 43µM solution of hydrogen peroxide. 210 µl of the solution was pipette onto 96 well micro titre plates. The absorbance was measured at 230 nm using ELISA reader.

% Inhibition = $\{(A_B - A_A) / A_B\} \times 100$,

Where A_B is the absorbance of blank sample and A_A the absorption of test sample.

c) ***Metal chelating activity on ferrous ions***

Metal chelating activity was determined according to the method of Decker and Welch (1990). The test solution (0.5ml) was mixed with 0.05ml of 2 mM $Fecl_2$ and 0.1 ml of 5 mM ferrozine. The total volume was diluted with 2 mM methanol and shaken vigorously. The solution (210 µl) was pipette onto 96 well micro titre plates and kept at room temperature for 10 minutes. The absorbance of the solution was measured at 562nm using ELISA reader. The % of inhibition of ferrozine-Fe^{2+} complex formation was calculated using the formula:

% Inhibition = $\{(A_B - A_A) / A_B\} \times 100$,

Where A_B is the absorbance of blank sample and A_A the absorption of test sample.

d) ***Total antioxidant activity***

The total antioxidant capacity was estimated by phosphomolybdenum method (Guddadarangavvanahally *et al*., 2004; Pongtip Sithisarn *et al*., 2005). Sulphuric acid (0.6 M) solution, sodium sulphate (28 mM) solution and ammonium molybdenate (4 mM) solution were mixed together and labelled as Total Antioxidant Capacity (TAC reagent). 100 µl of the test solution was dissolved in 1 ml of TAC reagent. From this solution 210 µl was pipette onto a 96 well micro titre plate. The absorbance was measured at 695 nm using ELISA reader. Blank was maintained with distilled water replacing the TAC reagent.

% Inhibition = $\{(A_B - A_A) / A_B\} \times 100$, where A_B is the absorbance of blank sample and A_A the absorption of test sample.

***In vitro* Cytotoxicity assay**

In vitro cytotoxicity was assessed in Vero cell lines (African, Green monkey Kidney, and Normal). The test solution was dissolved in 1 ml of DMSO and the volume was made up to 10 ml with maintenance medium to obtain a stock solution of 10 mg/ml concentration, sterilized by filtration and further dilutions were made from the stock. The cytotoxic assays were carried out using 0.1 ml of cell suspension, containing 10,000 cells/well of a 96 well microtitre plate. Fresh medium containing different concentrations of the test solution were added after 24 h of partial monolayer. Control cells were incubated without test solution and with MEM. The microtitre plates were incubated at 37 ºC in a humidified incubator with 5 percent CO_2 for a period of 72 h. Four wells were used for each concentration of the test solution. The morphology of the cells was inspected daily. The cytopathogenic effect (CPE) was scored. The 50 percent cytotoxic concentration (CTC_{50}) was determined by the standard MTT assay (Francis and Rita, 1986). After 72 h, 20 µl of MTT solution (2 mg/ml in PBS)

was added to the plates and was incubated for 4 h at 37 ºC. MTT-formazon crystals formed were dissolved in 100 µl of iso propanol and optical density was read with a microtitre plate reader (Biorad) at 570 nm.

Results

The ethanolic extract of *Strobilanthes cuspidata* was tested for antioxidant activity by several tests, namely DPPH free radical scavenging activity, hydrogen peroxide assay, metal chelating activity on ferrous ions and Total antioxidant activity.

a) DPPH radical scavenging activity

Free radical, 2, 2-diphenyl-1-picrylhydrazine (DPPH) is widely used in testing the ability of compounds to act as free radical scavengers or hydrogen donors and to evaluate antioxidant activity. The radical scavenging activity was expressed as the percentage of reduction of the initial DPPH radical absorbance by the extract. The extract may scavenge DPPH radicals in dose dependent manner with increased activities at higher concentration (Figure-1). The results obtained are listed in Table-14.The inhibitory concentration of the plant extract against the DPPH radicals was calculated as 132 µg/ml. The known synthetic antioxidant Rutin showed the IC_{50} value of 140 µg/ml. The results of DPPH scavenging activity assay in this study indicates that the extract were active.

b) Hydrogen Peroxide assay

In hydroxyl radical scavenging method, the extract exhibited antioxidant activity in dose dependant manner and increased with concentration IC_{50} values of both standard and extract in hydrogen peroxide scavenging assay are shown in Table-15 (Figure-2). The inhibitory concentration of the plant extract against the hydrogen peroxide assay was calculated as 185.4 µg/ml. The known synthetic antioxidant rutin showed the $IC_{50\ value}$ of 150 µg/ml. However the hydrogen peroxide activity of rutin was relatively more pronounced than the extract.

c) Metal chelating activity on Ferrous ions.

The results obtained are listed in Table-16 (Figure-3).The inhibitory concentration of the plant extract against the ferrous ions was calculated as 225 µg/ml. The known synthetic antioxidant rutin showed the $IC_{50\ value}$ of 165 µg/ml. A known synthetic antioxidant rutin showed higher activity than the extract.

d) Total antioxidant activity

The results obtained are presented in Table-17 (Figure-4). The inhibitory concentration of the plant extract against the ferrous ions was calculated as 90 µg/ml. The positive control rutin showed the IC_{50} value of 145 µg/ml. The results of total antioxidant activity on ferrous ions indicates that the extract were active.

Table-1 - DPPH radical scavenging activity.

Concentration(µg/ml)	% inhibition	IC_{50}(µg/ml)
125	47.97 ± 0.65	132
250	53.00 ± 0.29	
500	58.09 ± 0.54	
1000	67.66 ± 0.76	
Standard (RUTIN)		140

Table-2 - Hydrogen Peroxide assay

Concentration(µg/ml)	% inhibition	IC_{50}(µg/ml)
125	42.73 ± 0.66	185.4
250	55.89 ± 0.39	
500	65.21 ± 0.47	
1000	66.60 ± 0.72	
Standard (RUTIN)		150

Table-3 - Metal chelating activity on Ferrous ions.

Concentration(µg/ml)	% inhibition	IC_{50}(µg/ml)
125	52.95 ± 0.35	225
250	50.24 ± 0.76	
500	49.30 ± 0.50	
1000	46.67 ± 0.24	
Standard (RUTIN)		165

Table-4 - Total antioxidant activity

Concentration(µg/ml)	% inhibition	IC_{50}(µg/ml)
125	44.76 ± 0.64	90
250	50.84 ± 0.40	
500	58.34 ± 0.23	
1000	59.36 ± 0.24	
Standard (RUTIN)		145

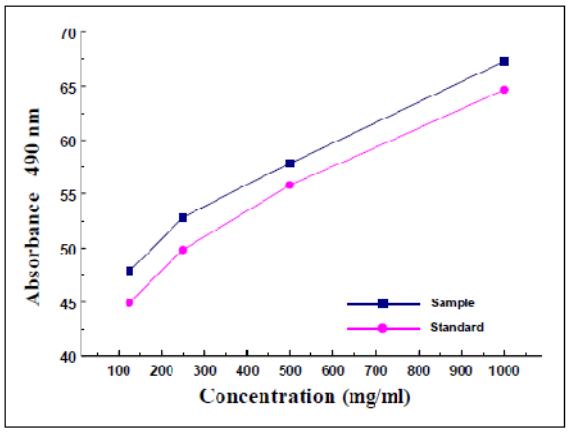

Figure 1- DPPH radical scavenging activity

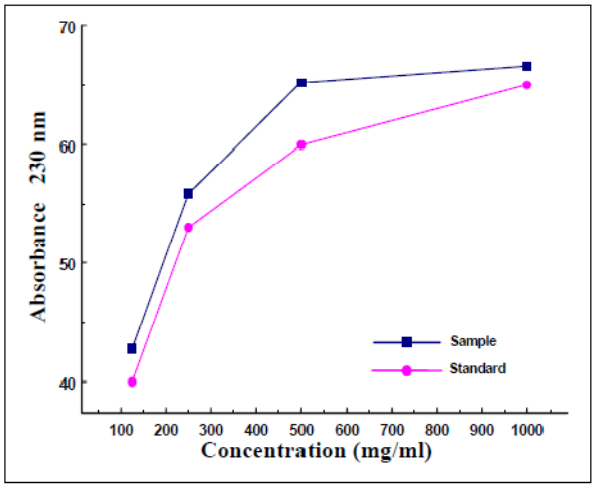

Figure 2- Hydrogen peroxide scavenging activity

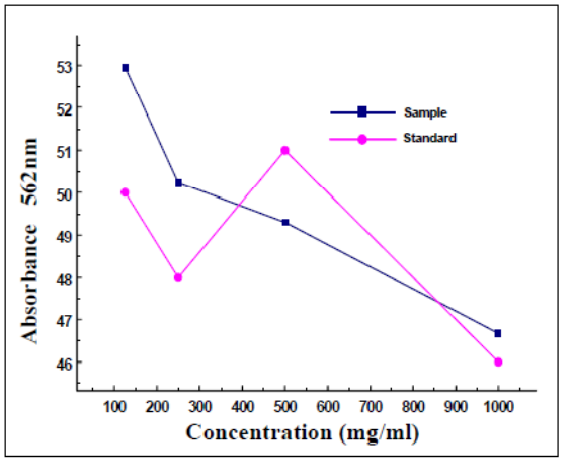

Figure 3- Metal chelating activity on ferrous ions

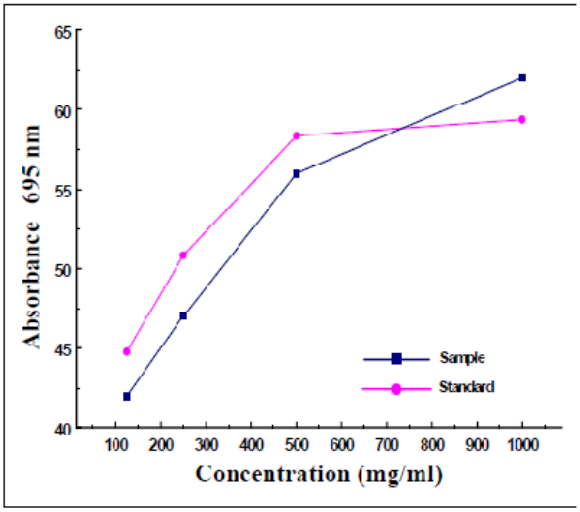

Figure 4-Total antioxidant activity

In vitro Cytotoxicity assay

The *in vitro* cytotoxic activity of the alcoholic leaf extract was assessed in Vero cell lines (African, Green monkey Kidney, normal). The CTC_{50} value (the effective concentration of the sample required to inhibit the cell growth by 50%) of the extract was calculated from the growth response curve plotted between percentage inhibition and concentration and was found to be 190 µg/ml .

Discussion

Extensive antioxidant studies have been carried out on medicinal plants of Acanthaceae family. *Strobilanthes* is a wide spread genus with a diversity of ethanobotanical uses. *Strobilanthes crispus (*Asmah Rahmat, 2006), *Strobilanthes asperrimus* (Pradeep, 2013), *S.ciliatus* (Jayaraman, 2014) proved to have high antioxidant activity. The results obtained in the present study indicate that the leaves of *S. cuspidata* are potential source of natural antioxidants and the antioxidant capacities of the alcoholic leaf extracts of *S. cuspidata* was evaluated by four *in vitro* methods.

The powerful antioxidants including superoxide anions, hydroxyl radicals and hydrogen peroxide are known as free radicals. Free radicals are unguided missiles that bounce around and attack healthy cells, tearing the cell membranes causing genetic damage and mutations. They react with serum lipoprotein (LDL) and cause the formation of atheromatous plagues or

react with the cell membranes lipid and cause of peroxidation of polyunsaturated fatty acids and cause generation of further free radicals. So, the antioxidants are needed in the different compartments of the body such as the circulating system inside the cells and across the blood-brain-barrier and central nervous system. Superoxide anion is a free radical generated by one electron transfer and plays an important role in the formation of other reactive oxygen species such as hydrogen peroxide, hydroxyl radical, or singlet oxygen in living system.

DPPH stable free radical method is an easy, rapid and sensitive way to survey the antioxidant activity of a specific compound or plant extracts (Koleva, 2002). When the odd electron becomes paired off in the presence of a free radical scavenger, the absorption reduces and the DPPH solution is decolorized as the colour changes from deep violet to light yellow. The degree of reduction in absorbance measurement indicated the free radical scavenging (antioxidant) activity of the extracts (Ayoola *et al*., 2008). The results of the DPPH free radical scavenging activity suggests that the leaf extract was capable of scavenging free radicals in dose dependant manner and thus may be able to prevent the initiation of free radicals mediated chain reactions by stabilizing reactive species. The DPPH free radical scavenging capacity showed significance results in *S. cuspidata* when compared to the standard/positive control (Rutin).This is supported by Wamtiga *et al*. (2006) who demonstrated that the six Acanthaceae members from Burkina Faso were the scavenging activity of all the samples on the DPPH radical was found to be strongly dependent on the extract concentration. It has been showed that the scavenging effects on the DPPH radical increase sharply with increasing concentration of the samples and standards to a certain extent (Motalleb *et al.*, 2005).

H_2O_2 plays a signaling role in various adaptive processes and has an appropriate intracellular balance between H_2O_2 generation and scavenging exists in all cells. In plants, increased H_2O_2 level induces not only of defense genes, but also other resistance genes (Mittler *et al.*, 2004). Hydrogen peroxide (H_2O_2) acts as a signaling molecule, the second messenger, mediating the acquisition of tolerance to both biotic and abiotic stresses (Desikan *et al.*, 2003).

Catalase breaks down hydrogen peroxide (H_2O_2) to water and molecular oxygen while GPx reduces H_2O_2 to water at the cost of oxidation of reduced glutathione (GSH) (Jena and Chainy, 2011). Hydrogen peroxide, a weak oxidizing agent inactivates a few enzymes directly by oxidation of essential thiol (-SH) groups (Hazra *et al*., 2008). Hydrogen peroxide radical scavenging activity of the leaf extract of *S.cuspidata* was dose dependant and increased with concentration. Similar results were observed in the methanolic extract of *Barleria montana* leaves showed prominent IC_{50} value of 51µ g/ml in Hydrogen peroxide method (Shanaz *et al.*, 2011).

Antioxidants inhibit interaction between metal and lipid through formation of insoluble metal complexes with ferrous ion (Hsu *et al*., 2003). The iron-chelating capacity test measures the ability of antioxidants to compete with ferrozine in chelating ferrous ion (Elmastas *et al*., 2006). Ferrozine can quantitatively form complexes with Fe2+. In the presence of samples possessing chelating activity, the formation of complexes is decreased. Therefore, measurement of the rate of color reduction helps to estimate the chelating activity of the samples (Chua *et al*., 2008). Metal chelating capacity of *S. cuspidata* increased with increase in concentration and revealed that has a less effective capacity for metal binding comparing to the positive control, suggesting that its action as an antioxidant may be related to its iron binding capacity.

The total antioxidant activity (TAC) is based on the reduction of Mo (VI) to Mo (V) by the extract and subsequent formation of green phosphate/Mo (V) complex at acid pH. TAC of the phosphomolybdenum model evaluates both water-soluble and fat-soluble antioxidant capacity (total antioxidant capacity). The results obtained in TAC indicate concentration dependent total antioxidant capacity. it means that the leaf extract of *S.cuspidata* will have to contain as much quantity of antioxidants compounds as equivalents of rutin to effectively reduce the oxidant in the reaction matrix. Antioxidant capacity of rutin has been used as a reference

standard from which plant extracts with potential antioxidant activity are compared (Aderogba *et al*., 2005)

In the present study the leaf extract of *S.cuspidata* showed dose dependent increase in antioxidant activity as the concentration increased and *Ecobolium linneanum* also supported the antioxidant activity and exhibited increasing trend with the increasing concentrations of plant extracts (Dipankar *et al.*, 2012).

The Colorimetric microculture tetrazolium (MTT) assay is based on the capacity of Mitochondria succinate dehydrogenase enzymes in living cells to reduce the yellow water soluble substrate 3-(4, 5-dimethyl thiazol-2-yl)-2, 5-diphenyl tetrazolium bromide (MTT) into an insoluble, colored formazan product which is measured spectrophotometrically (Sanjay Patel *et al.*, 2009). Since reduction of MTT can only occur in metabolically active cells, the level of activity is a measure of the viability of the cells. The cytotoxicity study was carried out for the leaf extract of *S. cuspidata*. The extract was screened for its cytotoxicity against Vero cell lines to determine the IC_{50} (50% growth inhibition) by MTT assay. The principal goal of this study was to determine if the leaf extract were cytotoxic at the dose level.

In the present study the leaf extract of *S. cuspidata* was assessed in Vero cell lines The 50 percent cytotoxic concentration (CTC_{50}) was determined by the standard MTT assay. The IC_{50} value of the alcoholic leaf extract was 190 µg/ml. Some of the studies reported here below throw light on the cytotoxic potentials in comparison with other plants belonging to the same or different genera using similar experimental methods

The cytotoxic activity of *S. cusia* leaves along with five other plants has been investigated on cancer cell lines .The results showed that the dichloromethane and ethyl acetate extracts exhibited a marked cytotoxicity therefore supporting the ethno pharmacological uses of these species. (Nguyen *et al.*, 2006)

Susi *et al.* (2007), studied and compared the cytotoxic effects of the extract of *S. crispus* on several kind of cancer cell lines. This was done *in vitro* using several kind of cancer cell lines and the mechanism was studied through the expression of cancer cell lines. *S. crispus* was found to be cytotoxic against human liver cancer cell (HepG2) and hormone dependent breast cancer cell lines (MCF-7). The cytotoxic effects of both plant extracts may be mediated by the down regulation of *c-myc* expression.

The cytotoxicity of standardized methanolic and aqueous extracts of *S. crispus* was analysed against a panel of cancer cell lines, namely, breast, colon, hepatocellular, lung and human breast ductal carcinoma and one normal colonic fibroblast cell line. The cell proliferation assay was performed using MTT assay. However only the higher concentrations of the extract demonstrated cytotoxicity against all cell lines except in breast cancer lines and the plant was concluded as a source of promising cytotoxic agents and angiogenesis inhibitors (Muslim *et al.*, 2010).

Anticancer activity of the methanolic extracts of root, stem and leaves of *Barlaria buxifolia* Linn against Dalton's Lymphoma Ascites (DLA) cells using MTT assay was evaluated. Cytotoxicity was assayed by trypan blue dye exclusion method and MTT assay used to evaluate the reduction of viability of cell culture. Cell viability was inhibited to different extents by different concentrations of the extract. The data revealed that methanolic extract of roots of showed potent cytotoxic activity with a minimum inhibition 7% at a concentration of 10µg/ml and maximum inhibition of 93% at a concentration of 200 µg/ml (Shivkumar, 2012).

Acanthus ilicifolius flower was cytotoxic towards lung fibroblast (L-929) cells in 72h MTT assay and the concentration required for 50% cell death was 18 µg/ml, meanwhile the methanol extract of this plant was cytotoxic Hela and κB cell line (Muhamad Firdaus, 2013).

The roots of *Justicea adhatoda* were extracted with organic solvent and were screened for cytotoxic activity using brine shrimp lethality bioassay. A reputed cytotoxic agent vincristine sulphate was used as a positive control. From the results n-hexane, ethyl acetate and chloroform soluble fraction of methanolic crude extracts possess cytotoxic principles (with LC50 1.129 µg/ml, LC50 1.402 µg/ml and LC50 2.130 µg/ml respectively) comparison with positive control vincristine sulphate (with LC50 0.563 µg/ml) (Mumita Meskat ,2012).

Initial screenings for cytotoxicity of ethanolic leaf and stem extracts of *Ecbolium linneanum* were performed on the HeLa cell line using the trypan blue assay. Among the plant extracts, ELLE induced over 80% death of Hela cells at a treatment concentration of 2mg/ml (LC50-460µg/ml) and ELSE (78%, LC50-490µg/ml). The cell viability data obtained in these extracts allow us to predict their potential not only because of the cystostatic effect, but in terms of potential for tumor reduction, (Dipankar, 2012).

Conclusion

The antioxidant capacities of the alcoholic leaf extracts of *S. cuspidata* was evaluated by using DPPH radical scavenging activity, hydrogen peroxide assay, metal chelating activity on ferrous ions and total antioxidant activity. DPPH radical scavenging activity of the leaf extract was significant and the IC50 value was calculated as 132 (µg/ml). Hydrogen peroxide assay was observed significance and the IC50 value was calculated as 185.4 (µg/ml). Metal chelating activity on ferrous ions was observed and the IC50 value was calculated as 225(µg/ml). The total antioxidant capacity of the extract was calculated based on the formation of the phosphomolybdenum complex and the IC50 value was calculated as 90(µg/ml). The *in vitro* cytotoxic activity of the alcoholic leaf extract was assessed in Vero cell lines. The 50 percent cytotoxic concentration (CTC50) was determined by the standard MTT assay which was significant. The CTC50 values of the alcoholic leaf extract was 190 µg/ml. The antioxidant, and cytotoxicity properties of the extract and will provide an insight into the medicinal properties and may inspire new biomedical applications for *S. cuspidata.*

Identification of Isolated Organisms from Petro Fields by Gene Sequencing

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Abstract

Hydrocarbon degradation can occur with diverse varieties of microbes in nature. Different chemical compounds have shown their susceptibility to the microbial degradation. . Fungal species generally forms carcinogenic trans – diols while bacterial species generally forms cis – diols. Contaminated soil contained significantly higher amount (50 – 75 %) of gram negative bacteria having genotypes enclosing genes compared to pristine soil (0 – 12.5 %). Application of bioinformatics tools like BLAST has identified microorganism asBacillus cereus, microorganism2 as Pseudoxanthomonasmexicana, microorganism3 as Halomonasdaqingensis and microorganism4 as Parapusillimonasgranuli. These microbes were given names accordingly from PS11 to PS14 respectively. They were assigned unique identification numbers starting from KM192258 to KM192261

Keywords: IDENTIFICATION, GENE SEQUENCING, *Bacillus cereus Pseudoxanthomonasmexicana, Halomonasdaqingensis, Parapusillimonasgranuli.*

Introduction

Few microbes show versatility for degradation of various compounds while some microbes can degrade only one or two components. 40 – 80 % of degradation of oil spills is managed by biodegradation process. Marine sediments, soil, estuaries, sea, etc. forms the various habitats for isolation of microbes having hydrocarbon degradation capability. Along with bacteria being the most significant agent for breakdown of hydrocarbons, few of the fungal species like *Candida*, *Fusarium*, *Trichoderma*,

Aspergillus are also known to degrade hydrocarbons. (Adibarata & Achibana 2009; Omotayo *et al*. 2011; Kafilzadeh *et al*. 2010) Amongst bacterial species, few species known for biodegradation of hydrocarbons are *Pseudomonas*, *Acinetobacter*, *Bacillus*, *Alcaligens*, *Micrococcus*. β– oxidation process is involved in biodegradation of alkanes.(Ting *et al*. 2009; Joo & Kim 2013) Aromatic hydrocarbon rings are generally hydroxylated to form diols which form cathecols and subsequently give intermediates of the TCA cycle.

Total degradation of aromatic hydrocarbons produces harmless end products like CO_2 and water. Earlier exposure of bacteria to hydrocarbons leads to increased degradation capacity along with the raised population of degrading bacteria at the site of contamination. Bacteria isolated from contaminated sites have greater chances to have plasmid which codes gene responsible for the degradation of hydrocarbon. Few well studies plasmids of *Pseudomonas* are TOL plasmid for toluene degradation, XYL for xylene degradation, CAM for camphor and SAL for salicylate.

Materials and methods

There are several methods are available for identification of microbes. Primary method includes study of colony morphology and gram staining. Both these method will give rough idea about the characteristic of microbes. Various Biochemical test as mentioned in the Bergey's manual and MIDI analysis can provide more information about the microbes but ribosomal small subunit sequencing is one of the most efficient and accurate method for identification of living organism. Since sequences of these subunit is highly conserved hence can be used widely for identification of microbes also.

As compare to the whole genome these region is very small and unique which makes it more potential for identification. However there are other conserved genes also but rarely used for identification. (Thenmozhi et al. 2011; Kumar et al. 2006; Shukla et al. 2010) Here, 16s rRNA sequencing was done as all the microbes were prokaryotes and the sequences obtained were compare with the database available on NCBI.(Singh & Fulekar 2010; Mittal & Singh 2009) All the sequences were submitted to NCBI and given universal identification numbers.

Results

As mentioned earlier ribosomal RNA gene sequencing was used for the identification of microbes. 16s ribosomal gene sequencing is one of the most reliable method for accurate identification of microbes. (Okoh 2006) The following nucleotide sequences were obtained which were further analyzed using bioinformatics tools.

Microorganism Sequence 1

gaaaccggggctaataccggataacattttgaacccgcatggttcgaaattgaaaggcggcttcggctgtcacttatggatggaccc
gcgtcgcattagctagttggtgaggtaacggctcaccaaggcaacgatgcgtagccgacctgagagggtgatcggccacactggga
ctgagacacggcccagactcctacgggaggcagcagtagggaatcttccgcaatggacgaaagtctgacggagcaacgccgcgtg
agtgatgaaggctttcgggtcgtaaaactctgttgttagggaagaacaagtgctagttgaataagctggcaccttgacggtacctaacca
gaaagccacggctaactacgtgccagcagccgcggtaatacgtaggtggcaagcgttatccggaattattgggcgtaaagcgcgcgc
aggtggtttcttaagtctgatgtgaaagcccacggctcaaccgtggagggtcattggaaactgggagacttgagtgcagaagaggaaa
gtggaattccatgtgtagcggtgaaatgcgtagagatatggaggaacaccagtggcgaaggcgactttctggtctgtaactgacactga
ggcgcgaaagcgtggggagcaaacaggattagataccctggtagtccacgccgtaaacgatgagtgctaagtgttagagggtttccg
ccctttagtgctgaagttaacgcattaagcactccgcctggggagtacggccgcaaggctgaaactcaaaggaattgacgggggccc
gcacaagcggtggagcatgtggtttaattcgaagcaacgcgaagaaccttaccaggtcttgacatcctctgaaaaccctagagatagg
gcttctccttcgggagcagagtgacaggtggtgcatggttgtcgtcagctcgtgtcgtgagatgttgggttaagtcccgcaacgagcgc
aacccttgatcttagttgccatcattaagttgggcactctaaggtgactgccggtgacaaaccggaggaaggtggggatgacgtcaaat
catcatgccccttatgacctgggctacacacgtgctacaatggacggtacaaagagctgcaagaccgcgaggtggagctaatctcata
aaaccgttctcagttcggattgtaggctgcaactcgcctacatgaagctggaatcgctagtaatcgcggatcagcatgccgcggtgaat
acgttcccgggccttgtacacaccgcccgtcacaccacgagagtttgtaacacccgaagtcggtgggggtaacctttttttgggagccag
cc c

Microorganism 2

agtgcggggtaatggcccaccaaggcgacgatcggtagctggtctgagaggatgatcagccacactggaactgagacacggtc
cagactcctacgggaggcagcagtggggaatattggacaatgggcgcaagcctgatccagccataccgcgtgggtgaagaaggcct
tcgggttgtaaagccctttttgttgggaaagaaatcctgtcgattaatactcggtggggatgacggtacccaaagaataagcaccggctaa
cttcgtgccagcagccgcggtaatacgaagggtgcaagcgttactcggaattactgggcgtaaagcgtgcgtaggtggtggtttaagtc
tgctgtgaaagccctgggctcaacctgggaattgcagtggatactggatcactagagtgtggtagagggatgcggaatttctggtgtag
cagtgaaatgcgtagagatcagaaggaacatccgtggcgaaggcggcatcctgggccaacactgacactgaggcacgaaagcgtg
gggagcaaacaggattagataccctggtagtccacgccctaaacgatgcgaactggatgttgggtgcaacttggcacccagtatcgaa
gctaacgcgttaagttcgccgcctggggagtacggtcgcaagactgaaactcaaaggaattgacgggggcccgcacaagcggtgga
gtatgtggtttaattcgatgcaacgcgaagaaccttacctggtcttgacatccacggaactttccagagatggattggtgccttcgggaac
cgtgagacaggtgctgcatggctgtcgtcagctcgtgtcgtgagatgttgggttaagtcccgcaacgagcgcaacccttgtccttagttg
ccagcacgtaatggtgggaactctaaggagaccgccggtgacaaaccggaggaaggtggggatgacgtcaagtcatcatggcccctt
acgaccagggctacacacgtactacaatggtggggacagagggctgcaaacccgcgagggtgagccaatcccagaaaccctatctc
agtccggattggagtctgcaactcgactccatgaagtcggaatcgctagtaatcgcagatcagcattgctgcggtgaatacgttcccgg
gccttgtacacaccgcccgtcacaccatgggagtttgttgcaccagaagcaggtagctt

Microorganism 3

ggggaaacccaggctaataccgcatacgtcctacgggagaaagcaggggacctttcgggccttgcgctatcggatgagcctatgt
cggattagctggttggtgaggtaatggctcaccaaggcgacgatccgtagctggtctgagaggatgatcagccacatcgggactgag
acacggcccgaactcctacgggaggcagcagtggggaatattggacaatgggcgcaagcctgatccagccatgccgcgtgtgtgaa
gaaggccctcgggttgtaaagcactttcagtggggaagaaagccttccggttaatacccgggaggagggacatcacccacagaaga

agcaccggctaactccgtgccagcagccgcggtaatacggagggtgcgagcgttaatcggaattactgggcgtaaagcgcgcgtag
gcggcttgataagccggttgtgaaagccccgggctcaacctgggaacggcatccggaactgtcaggctagagtgcaggagaggaa
ggtagaattcccggtgtagcggtgaaatgcgtagagatcgggaggaataccagtggcgaaggcggccttctggactgacactgacgc
tgaggtgcgaaagcgtgggtagcaaacaggattagataccctggtagtccacgccgtaaacgatgtcgactagccgttgggtccttcg
cggactttgtggcgcagttaacgcgataagtcgaccgcctggggagtacggccgcaaggttaaaactcaaatgaattgacgggggcc
cgcacaagcggtggagcatgtggtttaattcgatgcaacgcgaagaaccttacctacccttgacatcctgcgaaccctcggagacgaa
ggggtgccttcgggaacgcagagacaggtgctgcatggctgtcgtcagctcgtgttgtgaaatgttgggttaagtcccgtaacgagcg
caacccttgtccctatttgccagcgattcggtcgggaactctagggagactgccggtgacaaaccggaggaaggtggggacgacgtc
aagtcatcatggcccttacgggtagggctacacacgtgctacaatggtcagtacaaagggttgcgaacttgcgagagtgagccaatcc
cagaaagctgatctcagtccggatcggagtctgcaactcgactccgtgaagtcggaatcgctagtaatcgtgaatcagaatgtcacggt
gaatacgttcccgggccttgtacacaccgcccgtcacaccatgggagtggactgcaccagaagtggttagcctaaccttcgggaggg
cgatcaccacgg

Microorganism 4

gggggataactacgcgaaagcgtggctaataccgcatacgccctacgggggaaaggggggattcttcggaacctctcactattg
gagcggccgatatcggattagctagttggtggggtaaaggcctaccaaggcgacgatccgtagctggtttgagaggacgaccagcca
cactgggactgagacacggcccagactcctacgggaggcagcagtggggaattttggacaatgggggcaaccctgatccagccatc
ccgcgtgtgcgatgaaggccttcgggttgtaaagcacttttggcagggaagaaacaggtctggcgaatacctggactgaatgacggta
cctgcagaataagcaccggctaactacgtgccagcagccgcggtaatacgtagggtgcaagcgttaatcggaattactgggcgtaaa
gcgtgcgcaggcggttcggaaagaagggtgtgaaatcccagggcttaaccttggaatggcattcttaactaccgggctagagtatgtc
agaggggggtagaattccacgtgtagcagtgaaatgcgtagagatgtggaggaataccgatggcgaaggcagccccctgggataat
actgacgctcatgcacgaaagcgtggggagcaaacaggattagataccctggtagtccacgccctaaacgatgtcaactagctgttgg
ggccttcgggccttagtagcgcagctaacgcgtgaagttgaccgcctggggagtacggtcgcaagattaaaactcaaaggaattgac
ggggacccgcacaagcggtggatgatgtggattaattcgatgcaacgcgaaaaaccttacctacccttgacatgtctggaatcccgaa
gagatttgggagtgctcgcaagagaaccggaacacaggtgctgcatggctgtcgtcagctcgtgtcgtgagatgttgggttaagtccc
gcaacgagcgcaacccttgtcattagttgctacgaaagggcactctaatgagactgccggtgacaaaccggaggaaggtggggatga
cgtcaagtcctcatggcccttatgggtagggcttcacacgtcatacaatggtcgggacagagggtcgccaagccgcgaggcggagcc
aatcccagaaacccgatcgtagtccggattgcagtctgcaactcgactgcatgaagtcggaatcgctagtaatcgcggatcagcatgtc
gcgtgatacgt

Application of bioinformatics tools like BLAST has identified microorganism1 as *Bacillus cereus*, microorganism2 as *Pseudoxanthomonasmexicana,* microorganism3 *as Halomonasdaqingensis* and microorganism4 as *Parapusillimonasgranuli.* Thesemicrobes were given names accordingly from PS11 to PS14 respectively. They were assigned unique identification numbers starting from KM192258 to KM192261

References

[1.] Adibarata, T.H. &Achibana, S.T., 2009. Microbial Degradation of Crude Oil by Fungi Pre-Grown on Wood Meal. Interdiscplinary studies on Environmental Chemistry, pp.317–322.

[2.] Joo, M.H. & Kim, J.Y., 2013. Characteristics of crude oil biodegradation by biosurfatant producing bacterium Bacillus subtilis JK-1. Journal of Korean Society for Applied Biological Chemistry, 59, pp.193–200.

[3.] Kafilzadeh, F., Farhangdoost, M. &Tahery, Y., 2010. Isolation and identification of phenol degrading bacteria from Lake Parishan and their growth kinetic assay. African journal of Biotechnology, 9(40), pp.6721–6726.

[4.] Mittal, A. & Singh, P., 2009. Isolation of hydrocarbon degrading bacteria from soils contaminated with crude oil spills. Indian Journal of Experimental Biology, 47, pp.760–765.

[5.] Okoh, A.I., 2006. Biodegradation alternative in the cleanup of petroleum hydrocarbon pollutants. Biotechnology and Molecular Biology, 1(2), pp.38–50.

[6.] Omotayo, A.E. et al., 2011. Degradation of aviation fuel by microorganisms isolated from tropical polluted soils. International Journal Of Biological and Chemical Sciences, 5(2), pp.698–708.

[7.] Shukla, K.P., Singh, N.K. & Sharma, S., 2010. Bioremediation: Developments , Current Practices and Perspectives. Genetic Engineering and Biotechnology Journal, pp.1–20.

[8.] Singh, D. &Fulekar, M.H., 2010. Benzene bioremediation using cow dung microflora in two phase partitioning bioreactor. Journal of hazardous materials, 175, pp.336–343.
[9.] Ting, S.Y., Tan, H.C. & Aw, C.S., 2009. Hydrocarbon-degradation by isolate Pseudomonas lundensis UTAR FPE2. Malasian Journal of Microbiology, 5(2), pp.104–108.

Ameliorating the Aphrodisiac Effect of *Stephania wightii* Arn. (Dunn) on Animal Model

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Abstract

Stephania wightii is an endemic medicinal plant traditionally used in India for various ailments. This study was set out to evaluate the aphrodisiac properties of methanolic aerial parts and tuber extracts of Stephania wightii using animal models. The methanolic tuber extract of S. wightii at the dose of 100 mg/kg body weight showed significant aphrodisiac activity on male wistar albino rats as evidenced by an increased the levels of reproductive hormones serum testosterone, Serum Luteinizing hormone and Serum Follicle-stimulating hormone. The efficiency was higher in the extract treated animals compared to the standard drug treated animal.

Keywords: *Aphrodisiac, Stephania wightii, testosterone, Luteinizing hormone, Follicle-stimulating hormone and animal model*

Introduction

An aphrodisiac is defined as an agent (food or drug) that arouses sexual desire. Some medicinal plants are extensively used as aphrodisiacs to relieve sexual dysfunction, or as fertility– enhancing agents. They provide a boost of nutritional value thereby improving sexual performance and libido (Yakubu *et al.*, 2005).

The family Menispermaceae consists of 70 genera and approximately 400 species. The species of *Stephania* have been proven to be a rich source of phytoconstituents like alkaloids, flavanoids, terpenoids, phenols, saponins and steroids. These plants also have been traditionally used for the treatment of asthma, tuberculosis, dysentery, hyperglycemia, cancer, fever, intestinal complaints, aphrodisiac, sleep disturbances and inflammation (Chopra *et al.*, 1958 and Gaur, 1999). The use of allopathic medicines has large number of side effects. These include irregularities of the rhythm of the heart, suicidal tendencies, mental disorders and tremors. Therefore it is necessary to look for an urgent solution to manage this problem.

Materials and methods

Collection of plant material

Aerial and tuber parts of *S. wightii* (except floral parts) was collected during the month of January 2011, from Wyanad district, Western Ghats of Kerala. The plant was identified and authenticated by a plant taxonomist.

Crude drug preparation

Freshly collected sample of *S. wightii* (aerial parts and tuber) from wild and were washed separately for 2-3 times with tap water followed by distilled water. The samples were dried under shade. All the dried parts were pulverized by mechanical grinder to get the powder through 100 mess sieve and then stored in an air tight container. Required quantity of powder was weighed and transferred to conical flask. The powder was fully immersed and extracted with petroleum ether first and defatted. The defatted samples were treated with methanol and it was placed in the mechanical shaker. This process was repeated for 1 week and then the extract was filtered through whatman paper. The filtrate was collected and evaporated to dryness. The concentrated residue was stored in the refrigerator for 4ºC and it was used for the biological studies.

Aphrodisiac activity

Experimental animals

Male and Female Wistar albino rats were obtained from the Animal house, Agricultural University, Trissur, Kerala. Feed (standard pellet diet) and water were supplied ad libitum. All the animals were housed and maintained at a temperature of 20-24ºC, relative humidity of 50-70%, and a 12 h light/dark cycle.

The experimental protocol has been approved by the Institution Animal Ethics committee and by the Regulatory body of the government (659/02/a/CPCSEA).

Preparation of male and female rats

The sexually active male rats were selected for the testing aphrodisiac activity of the extracts. Sildenafil citrate (0.5 mg/kg) body weight has given to the male rats prior to experimentation. The female rats were brought in oestrous phase by treating them with Estradiol valerate (10µg/ kg body wt.) and hydroxy progesterone (1.5mg/kg b.wt.) for 5 hours prior to experimentation respectively, to make them for sexually acceptable and were selected for the study.

Follicle Stimulating Hormone (FSH), Lutinizing Hormone (LH) and Testosterone (T) levels were estimated by the method of Tietz (1995).

Experimental design

Group I: Rats given normal saline given (by using an intragastric catheter tube (IGC).

Group II: Rats given methanolic extract of aerial parts of *S. wightii* drug at the dose of 100 mg/ Kg body weight, orally by IGC.

Group III: Rats given methanolic extract of tuber of *S. wightii* drug at the dose of 100 mg/ Kg body weight orally by IGC.

Group IV: Rats given standard drug Sildenafil citrate (5 mg/kg body weight) 1 h prior to the commencement of the experiment.

Result and discussion

Reproductive hormone profile

The administration of methanolic extracts of aerial and tuber parts of *S. wightii* resulted in a significant increase in serum testosterone, Serum Luteinizing hormone and Serum Follicle-stimulating hormone concentrations throughout the period of administration ($P < 0.05$) and the elevation of these hormones levels were recorded in tuber extract treated rats at the dose of 100 mg/kg b.wt. The moderate activity observed in the aerial parts extract treated groups. All the results compared with control groups (Table 1).

Table 1: Effect of methanolic extract of aerial parts and tuber of *Stephania wightii* on sex hormones levels in male albino rats

Treatment Groups	Parameters		
	Testosterone (ng/ml)	**LH/ICSH (µIu/ml)**	**FSH (µIu/ml)**
Group I	2.13±0.62	1.54±0.34	0.89±0.04
Group II	2.31±0.73	0.91±0.64	3.41±0.41**
Group III	4.01±0.29**	1.06±0.91*	2.64±0.55**
Group IV	4.33±0.74*	1.33±0.51	1.87±0.84

Each Value is SEM of 5 animals * P < 0.05. Control Vs Treat; NS-not singnificant.

Testosterone supplementation has previously shown to improve sexual function and libido (Aversa and Fabbri, 2001), in addition to the intensity of orgasm and ejaculation which is likely to improve (Morales, 1996). It also helps in maintaining body shape, and increasing muscle mass and strength. Therefore, the increase in testosterone will enhance androgen-dependent parameters like mating behaviour, blood count, bone density and maintenance of spermatogenesis (Pardridge, 1986). Luteinizing hormones (LH) and Follicle Stimulating Hormone (FSH) produced by anterior pituitary lobe are necessary for maintaining testosterone levels such that as LH and FSH increases so do the testosterone. Therefore, a medicinal plant acclaimed to have aphrodisiac potential apart from being able to increase the concentration of bioavailable/free testosterone should cause increase in the concentrations of serum LH and FSH. An increase in the concentrations of LH and FSH should normally increase the testosterone concentration. Therefore, an increase in testicular and serum free testosterone concentration confirmed aphrodisiac potential inherent of *S. wightii*.

Conclusion

Stephania wightii is an endemic medicinal plant used in the treatment of various ailments in the history of traditional medicine. It has been reported that they contain major Phytoconstituents like alkaloids, flavanoids, terpenoids, phenols, saponins and steroids. These phytoconstituents may be responsible for the presently observed pharmacological activity. Apart from these, isolation, characterization of the active constituents and discovery of novel drugs of *S. wightii* will be suggested for further study.

References

[1.] Yakubu M.T., A.M. Akanji and A.T. Oladiji, 2005. Aphrodisiac potentials of the aqueous extract of *Fadogia agrestis* (Schweinf. Ex Hiern) stem in male albino rats. *Asian J. Androl.,* 7: 399-404.

[2.] Gaur R.D., 1999. Flora of district Garhwal North West Himalaya (with ethnobotanical notes) Ist ed. Transmedia Srinagar Garhwal, India, pp: 76-77.

[3.] Chopra R.N., I.C. Chopra, K.L. Handa and L.D. Kapur, 1958. Chopra's Indigenous Drugs of India, 2nd ed. Char UN and Sons, Ltd., Calcutta, India, pp: 412.

[4.] Tietz N.W., 1995. Clinical guide to laboratory tests, 3rd edition, (Ed) W. B. Saunders, Philadelphia, pp: 578-580.

[5.] Aversa A and A. Fabbri, 2001. New oral agents for erectile dysfunction: what is changing in our practice? *Asian J. Androl.,* 3: 175-179.

[6.] Morales A., 1996. Androgen supplementation in practice: the treatment of erectile dysfunction associated with hypotestosteronemia. In: Oddens BJ, Vermeulen A, (Eds). Androgens and aging male. London: Parthenon Publishing Group, pp: 233-45.

[7.] Pardridge W. M., 1986. Serum bioavailability of sex steroid hormones. *Clin Endocrinol Metab,* 15: 259-278.

Insilico Functional Annotation of Hypothetical ORFs in Human Chromosome2

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Abstract

The high-throughput genome projects have resulted in a rapid accumulation of genome sequences for a large number of organisms and large number of genes with unknown function (Hypothetical). To fully realize the value of the data, scientists need to identify proteins encoded by these genes and understand how these proteins function in making up a living cell. With experimentally verified information on protein function lagging far behind, computational methods are needed for reliable and large-scale functional annotation of proteins. Functional annotation is the process of identifying for a given gene its biological function, interaction with other elements, involvement in metabolic pathways, and any other piece of information that helps in understanding when and how a gene influences the overall system. On the other hand, many Biological Processes and Disease mechanisms are still unknown due to lack of knowledge about the function of the Hypothetical genes in Human. Once its function is revealed the so called hurdle of unknown mechanism of the Human Genome can be mastered. Hence, the present study aims to use computational approaches to annotate the function of hypothetical genes in Chromosome 2 of Human. The annotation of the hypothetical genes in human chromosoem2 was done both at the nucleotide and protein level. Among the 41 uncharacterized hypothetical genes in Human chromosome 2, the functions of 27 of them were successfully annotation. Further, experimental validation is essential to confirm the predicted function.

Keywords: *Annotation, Chromosome2, Function, Hypothetical genes*

Background

The high-throughput genome projects have resulted in a rapid accumulation of genome sequences for a large number of organisms and large number of genes with unknown function (Hypothetical). In biochemistry, a hypothetical protein encoded by a hypothetical gene is a protein whose existence has been predicted, for which there is no experimental evidence for expression *in vivo (*Zarembinski *et al* 1998). As a result, the function of such genes is not known. This is due to the fact that they are predicted using computational methods, which rely on signals in DNA sequences to predict it as a gene or based on similarity to genes in other organisms. In this case, the function of these homologous genes is also not known. Not only in Human Genome, in all genomes sequenced to date, a large portion of these organisms‟ protein coding regions encodes polypeptides of unknown biochemical, biophysical, and/or cellular functions.

The usual scenario involving a hypothetical protein is in gene identification during genome analysis. When the bioinformatics tool used for the gene identification finds a large open reading frame without an analog in the protein database, it returns "hypothetical protein" as an annotation remark. To fully realize the value of the data, scientists need to identify proteins encoded by these genes and understand how these proteins function in making up a living cell.

Despite several efforts, only 50-60 % of genes have been annotated in most completely sequenced genomes and their functions are known. The rest 40% of the genes in any genome

is totally unknown in terms of its functions. The experimental characterization of such a huge number of hypothetical genes will take many decades before the biological function encoded by such hypothetical genes is known.

As of September 2014, there are around 637 genes encoded as Hypothetical in NCBI. These hypothetical ORFs may be functionally important and play very important roles in growth, development and maintenance of *Homo sapiens*. Research is needed to unravel the function of these conserved hypothetical genes in Human to understand more about molecular mechanisms and biological significance of the entire Human Genome. The 637 hypothetical ORFs in the Human Genome are encoded as „Hypothetical" because its expression and existence is not proved and hence its function is also unknown.

Many Biological Processes and Disease mechanisms are still unknown due to lack of knowledge about the function of these Hypothetical genes. Once its function is revealed the so called hurdle of unknown mechanism of the Human Genome can be mastered. Automated genome sequence analysis and annotation may provide ways to understand genomes. Thus, determination of protein function is one of the challenging problems of the post-genome era. This demands bioinformatics to predict functions of un-annotated protein sequences by developing efficient tools and methods. In addition, previous studies on hypothetical genes in other organisms have revealed that many hypothetical proteins are expressed and are involved in many important biological functions (Tobias *et al*., 2008; Chen *et al*., 2003). Similarly, experimental analysis on human embryonic stem lines reports proof for expression of hypothetical genes in the Human Genome (Bhattacharya *et al.*, 2004). On the other hand, a hypothetical gene *FLJ30473* in chromosome 22 was found to express in multiple human tissues, including brain, colon, heart, kidney, liver, lung, muscle, ovary, pancreas, placenta, small intestine, and testis and is homologous to apoptosis-inducing factor (Xie *et al*., 2005). But they employ either computational and experimental methods or just experimental methods only. However, computational functional annotation of Human proteins revealed functional descriptors for 7 Hypothetical genes (Roy, 2008). But high throughput functional annotation of hypothetical genes in the Human Genome using computational methods is not yet attempted and experimental methods are laborious and time consuming. So, the present investigation focused on functional annotation of hypothetical genes in the Human Genome with the following Objectives:

1. To identify the uncharacterized hypothetical Genes in chromosome2 of the Human Genome.
2. To annotate the function of the uncharacterized hypothetical genes in the human Genome both at gene and Protein level.
3. To assign functional categories for the annotated hypothetical genes.
4. To assign transmembrane Topology and Sub-Cellular Localization for the unannotated Hypothetical Genes.

Methodology

The Hypothetical ORFs in chromosome 2 of the Human Genome was retrieved from NCBI [Geer *et al*., 2010]. To identify whether the ORFs can actually be genes two strategies were followed. Initially, conservation of the ORF in other organisms was determined using Homologene[Geer *et al*., 2010] and then its coding potential was calculated using Coding Potential Calculator (CPC) [Lei Kong et al., 2007]. Conservation and coding potential were determined, because the ORFs have a high probability to be functional if they are conserved and having a higher coding potential score.

Next, the annotation of the hypothetical genes which are conserved and with coding potential at the nucleotide level was done using BLAST2GO [Ana *et al*., 2005] with the following algorithm: Initially, the sequence was queried against BLAST to find homologs followed by mapping of the sequence with GO terms including running Interproscan. At the protein level, pfam [Robert *et al*., 2013] and supfam database[Pandit *et al*., 2002] were used to assign domains and superfamily to the hypothetical proteins. Finally, COG[Geer *et al*.,

2010] and SCOP[Murzin et al., 2002] were used to assign functional category to the hypothetical genes.

The transmembrane topology and subcellular localization were predicted for the unannotated hypothetical genes using TMHMM[Krogh et al., 2001] and PSort[Nakai and Horton, 1999]

Results and discussion

The 41 hypothetical ORFs present in chromosome 2 of the human genome were retrieved from NCBI and it was found that, it contains 9 characterized genes. The remaining 32 hypothetical ORFS were tested to find whether they can be functional and non-functional. For this purpose, Homologene and Coding Potential Calculator were used. The results are tabulated in Table 1.

Table 1 Conservation and Coding Potential of Hypothetical Genes in Human Chromosome 2

Sl No.	**Gene Name**	**Conservation**	**Coding Potential**
1	C2orf27A	*Pan troglodytes*	3.69038
2	C2orf88	*Pan troglodytes, Bos taurus, and Mus musculus.*	1.34178
3	C2orf61	*Pan troglodytes, Mus musculus*	3.71202
4	C2orf65	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Gallus gallus, and Danio rerio.*	8.58827
5	C2orf54	*Pan troglodytes, Bos taurus, Mus musculus, Rattus norvegicus, and Gallus gallus.*	11.9126
6	C2orf63	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, and Rattus norvegicus*	10.1827
7	C2orf74	*Pan troglodytes, Canis lupus familiaris, Mus musculus, and Rattus norvegicus.*	1.99556
8	C2orf57	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, and Rattus norvegicus*	7.0881
9	C2orf82	*Bos taurus, Mus musculus, Rattus norvegicus, and Gallus gallus.*	1.858
10	C2orf80	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, and Danio rerio.*	5.41768
11	C2orf72	*Pan troglodytes, Bos taurus, and Mus musculus.*	5.57153
12	C2orf67	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Musmusculus, Rattus norvegicus, Gallus gallus,* and Danio rerio	10.6203
13	C2orf68	*Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, and Danio rerio*	1.74447
14	C2orf81	*Pan troglodytes, Mus musculus, and Rattus norvegicus*	11.8126
15	C2orf29	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, Gallus gallus, Danio rerio, Drosophila melanogaster, Anopheles gambiae, Arabidopsis thaliana, and Oryza sativa*	8.08018
16	C2orf50	*Pan troglodytes, Canis lupus familiaris, and Rattus norvegicus*	3.16047
17	C2orf53	*Bos Taurus*	6.01493
18	C2orf43	*Pan troglodytes, Bos taurus, Mus musculus, Rattus norvegicus, Gallus gallus, Danio rerio, Drosophila melanogaster, Anopheles gambiae, Caenorhabditis elegans, Arabidopsis thaliana, and Oryza sativa.*	4.38865
19	C2orf76	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, Gallus gallus, and Danio rerio.*	2.37845

20	C2orf47	*Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, Gallus gallus, and Danio rerio.*	5.27806
21	C2orf77	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, and Gallus gallus.*	12.1034
22	C2orf73	*Pan troglodytes, Canis lupus familiaris, Bos taurus, and Rattus norvegicus*	5.9361
23	C2orf70	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, Gallus gallus, and Danio rerio.*	5.25668
24	C2orf69	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, Gallus gallus, and Danio rerio.*	7.22082
25	C2orf84	*Bos taurus, Mus musculus, and Rattus norvegicus*	3.19605
26	C2orf66	*Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, and Gallus gallus.*	1.36366
27	C2orf62	*Pan troglodytes, Canis lupus familiaris, Bos taurus, Mus musculus, Rattus norvegicus, and Danio rerio*	9.45344
28	C2orf85	*Pan troglodytes, Canis lupus familiaris, Bos taurus*	9.12913
29	C2orf15	*Pan troglodytes*	0.967256 *
30	C2orf27B	*Pan troglodytes*	4.77747
31	C2orf48	*Not Conserved*	0.774314 *
32	C2orf16	*Canis lupus familiaris, Bos Taurus*	8.16544

*Weak Coding Potential

From Table 1, it is clear that, all the hypothetical genes except C2orf48 in Chromosome 2 of human are conserved; 30 genes (73%) are conserved in *Mus musculus*, 32 genes (78%) are conserved in *Pan troglodytes*, 30 genes are conserved in *Bos Taurus* (73%), 27 genes (65%) are conserved in *Rattus norvegius*, 27 genes (65%) are conserved in *Canis lupus familiaris*, 18 genes (43%) are conserved in *Gallus gallus*, 17 genes (41%) are conserved in *Danio rerio*, 5 genes are conserved in *Drosophila melanogaster*, 5 genes are conserved in *Anopheles gambiae*, 2 genes are conserved in *Caenorhabditis elegans*, 1 gene in *Plasmodium falciparum*, 3 genes are conserved in *Arabidopsis thaliana and Oryza sativa.* All the hypothetical genes in Chromosome2 of human have strong coding potential for proteins except C2orf15 and C2orf48 which have weak coding potential.

The Superfamily identification using Superfamily database revealed the domains of 4 hypothetical genes and interproscan in BLAST2GO identified another 5 important domains among the 32 uncharacterized hypothetical genes in the human genome. Among the predicted domains, the hypothetical genes „C2orf82" contain a conserved domain called „AF0104" whose function is not annotated according to SCOP category. Similarly the „ARM REPEAT" identified within „C2orf63" by SUPFAM did not have functional annotation but the interproscan has successfully identified glycoside hydrolase within this hypothetical protein. This is due to the fact that failure of one annotation method can be compensated by usage of multiple methods resulting in identification of the function of hypothetical genes. Since, earlier studies have revealed that, hypothetical proteins contain fewer Pfam domains than known genes and the majority of these domains found in hypothetical proteins are annotated as "Domains of Unknown Functions (DUFs)" (Ramachandran *et al.*, 2009), three more Uncharacterized domains were identified by pfam.

The BLAST2GO annotation has identified the two hypothetical genes „C2orf27a" and „C2orf62" to encode a protein with kinase activity and two hypothetical genes („C2orf29" and „C2orf74") with oxidoreductase activity. The another two hypothetical genes C2orf48 and C2orf16 has metal binding activity and phosphatase activity respectively, accounting for a total of 6 hypothetical genes to involve in important metabolic process of the human genome. The results are presented in Table 2. Soumelis *et al*., (2010) has discussed about the presence of more number of proteins and enzymes in chromosome 2 for information processes such as replication, transcription and translation because of the speed in which

these process takes place. In accordance with this study two more genes „C2orf15" and „C2orf48" are involved in transcription among the hypothetical genes in chromosome 2. All these hypothetical genes were assigned functional category using SCOP or COG. The functional categories of these hypothetical genes using SCOP and COG are presented in Table 3.

Table 2 Functional annotation of Hypothetical Genes in Chromosome 2

Sl No.	GENE NAME	COMPONENT, PROCESS, FUNCTION	DOMAIN / SUPER FAMILY	FUNCTION	FUNCTIONAL CATEGORY	
					COG	SCOP
1	C2ORF27A	C: Endomembrane System; C: Trans-Golgi Network; C: Cytosol; P: Protein Localization; F: Protein Kinase Binding; C: Plasma Membrane	-	Regulation: Signal Transduction	T	-
2	C2ORF88	C: Extracellular Region	Copper Type II, Ascorbate-Dependent Monooxygenase	Metabolism: Oxidation/ Reduction	-	RA
3	C2ORF63	F: Binding; P: Carbohydrate Metabolic Process	Glycoside Hydrolase; ARM Repeat	Metabolism: Other Enzymes	-	RC;R
4	C2ORF74	C: Integral to Membrane F:Oxidoreductase Activity	Short-Chain Dehydrogenase/Reductase	Metabolism: Oxidation/Reduction	-	RA
5	C2ORF82	C: Integral to Membrane	AF0104/ALDC/Ptd012-Like	Not Annotated	-	NONA
6	C2ORF72	F: Protein Binding C: Extracellular Region	Heat Shock Protein 70	Cellular Processes: Posttranslational Modification, Protein Turnover, Chaperones	O	-
7	C2ORF29	F: Molecular P: Cell Proliferation C: Cellular Component P: Cell Proliferation; F: Zinc Ion Binding; F: Oxidoreductase Activity; P: Oxidation Reduction	Alcohol Dehydrogenase, Zinc-Containing	Metabolism: Energy Production and Conversion	C	-
8	C2ORF43	F: Catalytic Activity	Alpha/Beta-Hydrolases	Metabolism: Other Enzymes	-	RC
9	C2ORF47	C: Mitochondrion C: Nucleus; F: Protein	-	General	-	R

		Binding; C: Cytoplasm				
10	C2ORF77	-	Tropomyosin	Processes_IC : Cellmotility	-	N
11	C2ORF62	F: Molecular Function; P: Biological Process; P: Signal Transduction; F: CAMP-Dependent Protein Kinase Regulator Activity	-	Cellular Processes: Signal Transduction Mechanisms	T	-
12	C2ORF85	C: Integral to Membrane	-	General	-	R
13	C2ORF15	F: DNA Binding; C: Membrane; C: Nucleus; F: Zinc Ion Binding; P: Regulation Of Transcription, DNA-Dependent	-	Information Storage and Processing: Transcription	K	
14	C2ORF27B	C: Integral to Membrane	-	General	-	R
15	C2ORF48	C: Intracellular Membrane-Bounded Organelle; F: Metal Ion Binding; C: Cytoplasmic Part; P: Transcription; P: Developmental Process; C: Membrane	-	Information storage and processing: Transcription	K	-
16	C2ORF16	P: Protein Amino Acid Dephosphorylation; F: Protein Tyrosine Phosphatase Activity	-	Regulation: Kinases and Phosphatases and Inhibitors	-	OB
17	C2ORF61	-	Cag-Z	Other: Unknown Function	-	S
18	C2ORF70	-	Galactose-Binding Domain-Like	Metabolism: Carbohydrate Transport and Metabolism	-	G

Table 3 Functional Categories for the Hypothetical Genes in Chromosome 2

S.No	**Group Code**	**Description**	***Number a***
COG category			
1	J, A, K, L, B	Information storage and processing	*2*

2	D, Y, V, T, M, N, Z, W, U, O	Cellular processes and signaling	*3*
3	C, G, E, F, H, I, P, Q	Metabolism	*1*
4	R, S	Poorly characterized	-
SCOP Category			
5	RF, RE, P, MA, RG, SB, D, IA, N, NA, O, OA	PROCESSES	*1*
7	CA, C, CB, E, EA,F, G, GA, GB, H, RA, RB, RC, I, M, Q	METABOLISM	*5*
8	HA, HB, HC, HE, R, RD, ST	GENERAL	*4*
9	B, J, K, L,LB, Y	INFORMATION	-
10	A, LA, OB, T, TA, HD	REGULATION	*1*
10	S, SA	OTHER	*1*
11	*NONA*	*NOT ANNOTATED*	*1*

a „–"indicates there is no newly annotated gene in this COG or SCOP functional category.

From table 3, it is evident that maximum number of hypothetical genes in chromosome2 are involved in metabolism according to SCOP functional category, which coheres with the study of Antony *et al* (1999).

Thus, among the 32 uncharacterized hypothetical genes in chromosome 2 of the human genome, functional annotation and functional categories were assigned successfully to 14 of them. In spite of serious efforts functional assignment for 14 of them could not be done, however their sub cellular localization and possibility of presence in membrane are presented in Table 4.

Table 4 Topology and Localization of Un-annotated Hypothetical Genes in Chromosome 2

S.No.	**Gene**	**Subcellular Localization**	**TM Topology**
1	C2orf65	Nucleus	No
2	C2orf54	Plastid	No
3	C2orf57	Nucleus	No
4	C2orf80	Nucleus	No
5	C2orf67	Nucleus	No
6	C2orf68	Nucleus	No
7	C2orf81	Nucleus	No
8	C2orf50	Nucleus	No
9	C2orf73	Cytoplasm	No
10	C2orf69	Mitochondria	No
11	C2orf84	Cytoplasm	No
12	C2orf53	Nucleus	No
13	C2orf76	Cytoplasm	No
14	C2orf66	Extracellular Region	Yes

Majority of the un-annotated hypothetical genes in Chromosome 2 are localized in Nucleus and the remaining are localized in extracellular region, Mitochondria and cytoplasm. But it is interesting to note that one of the un-annotated hypothetical genes in Chromosome 2 (C2ORF66) contains transmembrane topology and localized in the extracellular region.

Conclusion

The present work has resulted in the identification of function for majority of the hypothetical proteins in the Human Chromosome 2 which can be validated experimentally Also, the functions predicted from the study gives a strong belief that the probability of expression of these hypothetical genes is very high, but further study is essential to know their expression condition. Another important aspect of such hypothetical ORFs also gives a clue that malfunctioning of similar functioning protein may enhance the expression of these

hypothetical genes and act as a standby gene for the functioning of the organism. The remaining un-annotated hypothetical genes were attempted to predict the topology and sub-cellular localization which gives preliminary clues to understand its function. On the other important techniques such as co-expression patterns analysis and phylogenetic profiling can be employed to understand the function of such genes.

References

[1.] Ana Conesa, Stefan Götz, Juan Miguel García-Gómez, Javier Terol, Manuel Talon and Montserrat Robles, Blast2GO: a universal tool for annotation, visualization and analysis in functional genomics research, Bioinformatics, 2005, Volume 21, Issue 18 Pp. 3674-3676.

[2.] Bhattacharya, A., Lakhman, S.S., Singh, S. (2004). Modulation of L-type calcium channels in Drosophila via a pituitary adenylyl cyclase-activating polypeptide (PACAP)-mediated pathway. J. Biol. Chem. 279(36): 37291--37297.

[3.] Chen, Y. and Xu, D. (2003) Computation analysis of high-throughput protein-protein interaction data. *Current Peptide and Protein Science*, 4, 159-181.

[4.] Geer LY, Marchler-Bauer A, Geer RC, Han L, He J, He S, Liu C, Shi W, Bryant SH. The NCBI BioSystems database. *Nucleic Acids Res.* 2010 Jan; 38(Database issue):D492-6. *(Epub 2009 Oct 23)*

[5.] Human epithelial cells trigger dendritic cell mediated allergic inflammation by producing TSLP.

[6.] Krogh A, Larsson B, von Heijne G, Sonnhammer EL Predicting transmembrane protein topology with a hidden Markov model: application to complete genomes. J Mol Biol. 2001 Jan 19;305(3):567-80.

[7.] Lei Kong, Yong Zhang, Zhi-Qiang Ye, Xiao-Qiao Liu, Shu-Qi Zhao, Liping Wei and Ge Gao, CPC: assess the protein-coding potential of transcripts using sequence features and support vector machine, Nucleic Acids Research, 2007, Volume 35, Issue suppl 2 Pp. W345-W349

[8.] Murzin A. G., Brenner S. E., Hubbard T., Chothia C. (1995). SCOP: a structural classification of proteins database for the investigation of sequences and structures. *J. Mol. Biol.* 247, 536-540.

[9.] Nakai K and Horton P. PSORT: a program for detecting sorting signals in proteins and predicting their subcellular localization, Trends Biochem Sci. 1999 Jan;24(1):34-6.

[10.] Nat Immunol. 2002 Jul;3(7):673-80. Epub 2002 Jun 10.

[11.] Pandit SB, Gosar D, Abhiman S, Sujatha S, Dixit SS, Mhatre NS, Sowdhamini R, Srinivasan N, SUPFAM--a database of potential protein superfamily relationships derived by comparing sequence-based and structure-based families: implications for structural genomics and function annotation in genomes. Nucleic Acids Res. 2002 Jan 1;30(1):289-93.

[12.] Robert D. Finn, Alex Bateman, Jody Clements, Penelope Coggill ,Ruth Y. Eberhardt, Sean R. Eddy, Andreas Heger, Kirstie Hetherington, Liisa Holm, Jaina Mistry, Erik L. L. Sonnhammer, John Tate and Marco Punta, Pfam: the protein families database, Nucleic Acids Research, 2013, Volume 42, Issue D1, Pp. D222-D230.

[13.] Roy, N. S., Farheen, S., Roy, N., Sengupta, S. and Majumder, P. P. (2008), Portability of Tag SNPs Across Isolated Population Groups: An Example from India. Annals of Human Genetics, 72: 82–89.

[14.] Shu-Ye Jiang1, Alan Christoffels2, Rengasamy Ramamoorthy1, and Srinivasan Ramachandran, Expansion Mechanisms and Functional Annotations of Hypothetical Genes in Rice Genome Plant Physiology Preview. Published on June 17, 2009, as DOI:10.1104/pp.109.139402

[15.] Soumelis V, Reche PA, Kanzler H, Yuan W, Edward G, Homey B, Gilliet M, Ho S, Antonenko S, Lauerma A, Smith K, Gorman D, Zurawski S, Abrams J, Menon S, McClanahan T, de Waal-Malefyt Rd R, Bazan F, Kastelein RA, Liu YJ

[16.] Tobias, J.A., Bates, J.M., Hackett, S.J. & Seddon, N. 2008. Comment on the latitudinal gradient in recent speciation and extinction rates of birds and mammals. Science 319: 901.

[17.] Xie X, Lu J, Kulbokas EJ, Golub TR, Mootha V, Lindblad-Toh K, Lander ES and Kellis M, Systematic discovery of regulatory motifs in human promoters and 3' UTRs by comparison of several mammals, Nature. 2005 Mar 17;434(7031):338-45. Epub 2005 Feb 27.

[18.] Zarembinski, T.I., Hung, L.W., Mueller-Dieckmann, H.J., Kim, K.K., Yokota, H., Kim, R., and Kim, S.H. 1998. Structure-based assignment of the biochemical function of a hypothetical protein: A test case of Structural Genomics. Proc. Natl. Acad. Sci. 95: 15189–15193

Parallelization of bioinformatics methods using a computational grid

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Abstract

Recent advances in computer science improve research in several areas. These include an area with great emphasis, the biology, which is the field of study of this work. The use of computer for analysis of data, and processing methods of biology is called bioinformatics. However, when are analyzed DNA sequences from complex organisms which have thousands nucleotides is required a greater processing power. Due to the increase the amount of data to be processed we can use HPCA. Within this context in this work, we study the use of computing capabilities in performance processing DNA sequences. More specifically the parallelization of methods used by the research group in bioinformatics at UCS(University of Caxias do Sul). For development this work we chose to use computational grids, since this type of platform provides a high processing capacity at low cost.

Keywords: *Parallel Computing, Bioinformatics, Computing Grid, Neural Network, DNA*

1. Introduction

Biology is the branch of science that studies the characteristics and behavior of organisms, and how these interact with each other's and with their environment. These characteristics and behaviors are defined by DNA(Deoxyribonucleic acid). Thus, the study of DNA can provide information on the genotype(data gene of an organism)[5][21]. Initially, the study of DNA was performed manually, later it moved to use computers for this task. However, with amount data increase, and the need for immediate results, there was necessary to use High Performance Computing Architectures(HPCA)[6].

As a first alternative of a high performance environment there is the supercomputer which can be characterized mainly by multiple units of processors and memory, connected via a proprietary network. But the cost is high and the acquisition for this technology is restricted[1]. Another option for achieving a high computational power is the computers clusters, which consist of a parallel environment comprising personal computers, connected by a local high-performance network. Even they cost is less than a supercomputer, they have a relatively high cost to invest in the computers, network and need maintenance[26]. An alternative to supercomputers and clusters are Grids. They are based on the use of non-dedicated computers to developing a high performance platform. Computational grids are designed to use of idle cycles of computers for processing. Since various institutions such as the UCS, have a large number of computers remain idle at various times the day this platform becomes attractive because it allows obtaining a high computational power through with low investment in equipment[27].

Often used as input data(DNA sequences) for these methods are obtained online repositories without restricted access, such as GenBank[9][21]. These databases are used, whether in obtaining data or updates for hundreds of institutions. Thus, because the large amount of data in those repositories, for processing such data is necessary use high performance computing. After the initial study of methods, an analysis was performed to adapt them to a grid platform with the aim to reduce the execution time of these tasks.

2. Molecular biology and bioinformatics

This section aims to describe the central dogma of biology. This will be addressed the basic and important concepts on this topic in order to make them understandable goals and the importance of computational methods used in the area of bioinformatics.

2.1. Molecule of DNA

The characteristics and the continuity of the bodies depend on the genetic material present cells. DNA is a molecule comprised of two tapes formed by repetitive units, called nucleotides, linked together, as seen in Figure 1. There are four types of nucleotides are denoted by the letters A(adenine), T(thymine), C(cytosine), G(Guanine) as illustrated in Figure 1[23]. In one molecule of the two strands of DNA nucleotides there are connections so that the nucleotide A in a tape binds to the T nucleotide and C nucleotide binds to the nucleotide G as can be seen in Figure 1[23].

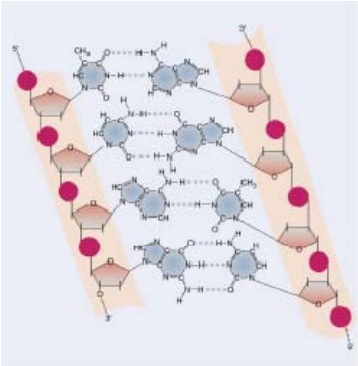

Figure 1: The mRNA takes the information from the DNA molecule in the nucleus of cytoplasm where translation occurs. In Figure 1 can see links between AT nucleotides with two bridges hydrogen's and GC with three bridges hydrogen's. The sequence is TA, CG, AT, GC(Lewin, 2001).

2.2. Central bology dogma

The central dogma defines the paradigm of molecular biology and includes three processes: replication, transcription and translation of DNA. DNA replication is a process in which a cell divides to form other, and this process is a semi-conservative type, since each strand contains a double helix generated old and other newly synthesized filament[20]. This process is responsible for the passage of information one generation to another. The transcription process converts the information into a DNA strand of RNA(mRNA), which will serve for translation. Since the translation process converts the information contained in the mRNA into proteins [23]. Transcription is the process by which a strand of DNA, called tape mold form single-chain mRNA by replacing the nucleotides A by U (Uracil), T by A, C and G by C to G (Lewin, 2001). Finally the translation is when every three nucleotides in that molecule are denominated mRNA codon and corresponding an amino acid and the set of amino acids will be translated in a protein[7](Lewin, 2001).

2.3. Methods used

The sequential implementation of the follow methods studied: calculation of Entropy, calculation of Periodicity, calculating the Clustering Coefficient and Calculation of the Dispersion Coefficient Clustering were developed by Prof. PhD. Gunther Johannes Gerhardt Lewczuk using the language C. The last method studied, Determination of Promoters through a Neural Network was developed and implemented by the Prof. PhD. Scheila de Avila e Silva using the R language[15].

2.3.1 Calculation of entropy

The Entropy is a thermodynamic magnitude usually associated with the degree of disorder of a the measuring system and of the energy can't be transformed into work. This is also natural phenomena to the following extent: complexity, compressibility, and predictability Randomness[28]. One of the main reasons for calculating the entropy be used in DNA molecules lies in the fact that with the its uses can

obtain the degree of organization of a sequence[22].



Figure 2: Sequence fully organized , with entropy 0 because there are only the nucleotides a

In Figure 2 there is a DNA sequence fully organized, i.e. a sequence whose entropy is 0. When the calculated entropy of a message is computed, for example, probably we will know the structure behind this message. The reason to apply the method of entropy in DNA sequences is the search for patterns. Through these patterns can searching regions of DNA that have specific meaning, such as the boundaries of the coding areas DNA, or even get some standard, and from, this check for some meaning organic[28].

For the calculation of the entropy is used as input a DNA sequence called window. This sequence S is composed of k nucleotides, where each element $x_i \in \{a, t, c, g\}$ and may be written as $S = \{x_1, x_2, \ldots, x_k\}$. Initially this method considers the amount of existing equal triplets DNA sequence, beginning at x_1, x_2, x_3 and moving one position to the right, so second triplet is x_2, x_3, x_4 and so on. Thus one obtains a set $(S) = \{j_1, j_2, ..., j_n\}$. With n positions, comprising $j_1 = Q(x_1, x_2, j_2 = x_3)$, $Q(x_2, x_3, x_4)$, ..., $j_k = Q(x_{k-2}, x_{k-1}, x_k)$, where $Q()$ indicates the number of times each sequence (single) triplet appears in the window.

This set can have a maximum of 64 positions, or 4 possible nucleotides combined in three positions. For the set $D(S)$, one can construct a discrete probability distribution $P = (p_1, p_2, ..., p_n)$ being p_i the probability of each sequence of triplets and which $\sum_i p_i = 1$, resulting in 1 because it is the sum of the probabilities p_i of each triplet is $p_i = \frac{j_i}{k}$. After obtain the distribution P can calculate the Shannon entropy of a discrete probability distribution by the formula[29]:

$$H(S) = H(D(S), P) = -\sum_{i-1}^{n} p_i log_2 p_i$$

2.3.2 Periodicity Search

This method seeks to establish relationships between the various biological patterns existing along a repetition sequence. The search periodicity occurs through the use of correlation functions (CF) that perform the count of the regions of nucleotides in a given range. For example, if the periodicity is 3, a comparison of a nucleotide with its two neighbors underlying will be made, as shown in Figure 3.



Figure 3: Distance of two nucleotides 3 characterizes the periodicity

On this CF various tools which can locate or map these regions, such as the Fourier transform, that maps an area in the CF frequency can be used. The periodicity 3 is the most studied since it is indicative of coding regions[16].

The search method uses frequencies up of an initial window of size k, where it is applied to the Kronecker correlation function for comparing each character in the window studied. The algorithm is the sequence of nucleotides as a circular chain[17]. In correlation function Kronecker each nucleotide is compared to all other window. The comparison returns 1 if two elements are equal and 0 if they are different.

Thus, $S(1)$ is the sum resulting from the comparison between the distance element 1, $S(2)$ is the sum of the comparison between the distance elements 2 and so on. Then $S(k)$ is the value of the correlation function to a distance between elements of the sequence k. This function is represented mathematically by

$$S(k) = \frac{\sum_{i=F}^{L} \delta_{i,((i+k+F) mod (L-F+1))+F}}{(L-F+1)}$$

where F and L represent the first and last elements of the window, respectively. The mod operator returns the remainder of division between the terms i + k + F and F + L 1, and d is the Kronecker delta function defined by:

$$\delta_{i,j} = \begin{cases} 1 \text{ for } x \neq y \\ 0 \text{ for } x = y \end{cases}$$

where *i* and *j* represent the positions of *x* and *y* represent the basis elements contained in these positions. Thus, in this correlation function are contained in the bases and *j* are equal, the Kronecker delta function returns 1, and otherwise returns 0. Using this correlation function can obtain the relationship between each element in the window relation to all other elements in the same window.

Is then removed the DC (Direct Current) from the result of the correlation function. This is done by subtracting the mean of each outcome the same for both, and need to add up all the results of the correlation function and divide by the size of the selected window. This process is also known as Zero Frequency therefore aligns the result of the correlation function in respect to $y = 0$, to facilitate data analysis.

About result of removing DC is applied to Fourier transform. From this you can see the correlation of each nucleotide by means of a frequency plot. This transformation of values in frequency space is given by the equation:

$$F\{S(n)\}(w) = \int_{-\infty}^{\infty} \frac{S(n)e^{-2\Pi win}dn}{\sqrt{2\Pi}}$$

where *i* is the imaginary unit $\sqrt{-1}$ and e Euler number. Thus with the application of the Fourier transform creates a space frequency due to the displacement S_k, where $F(w)$ is given by the signal $S(k)$ in the frequency domain, i.e. the spectrum.

2.3.3 Calculus of clustering coefficient

Using a graph theory to analyze the clustering coefficient sequence is another method used in this work. Initially, the DNA sequence is transformed into a graph[13], where each graph vertex corresponds to a triplet of nucleotides, and two vertices are connected by an edge if its nucleotides are juxtaposed[4], as can be seen in Figure 4.

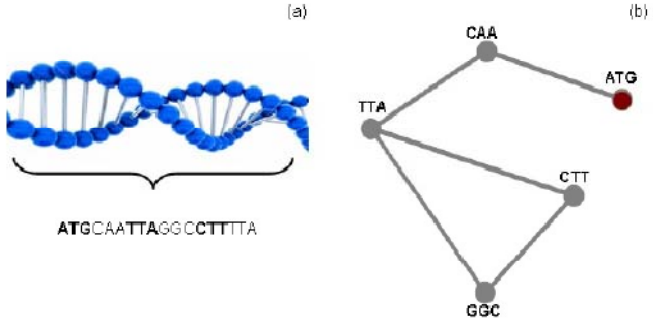

Figure 4: (a) Sequence of nucleotides. (b) Graph of the sequence (a). Each vertex is a triplet of nucleotides starting at ATG.

Then, in the resulting graph clustering method that checks the density of triangles in order to determine whether this graph is arranged is used. This measure lets you check whether or not the graphs have a standard in its structure. If the pattern does not exist, their clustering coefficients is similar to a random graph; But when you have a standard structure, you can find evolutionary traits[13].

This method has as input a sequence of nucleotides S. Initially this method transforms this sequence S in an undirected graph where the vertices are triplets of nucleotides and a link is established between two triplets, when these are juxtaposed in the DNA sequence. The method uses the first two triplets that are juxtaposed and assigns each triplet a single value, forming an edge between these two vertices (points), and so the triplets juxtaposed by the end of the sequence S. For the representation of the graph used a structure of m adjacency matrix of order N, where the element m_i is 1 if node *i* is connected to the vertex *j* else if 0 if not connected.

The clustering method aims to calculate the level of clustering of vertices. c_i representing the clustering coefficient for this level of grouping is a value given by a vertex *i*, that is, calculate the number of edges

between vertices adjacent to vertex *i*. If vertex *i* is connected to a subgraph *C*, the number of links between the vertices of this subgraph *C* is calculated by:

$$L_i = \sum_{j=1}^{L} \left(m_{i,j} \left[\sum_{k \in C} m_{i,k} \right] \right)$$

To find c_i we must normilize L_i for all possibles links k_i between the vertex *i* and the vertex of subgraph *C*, throwout:

$$c_i = \frac{2L_i}{k_i(k_i - 1)}$$

When $k_i = 0$ or $k_i = 1$ we can define $c_i = 0$. Finally *c*, which corresponds at the clustering coefficient for the graph, is obtained by averaging the coefficients of clustering of all sub graphs , as follows:

$$C = \frac{1}{L} \sum_{i=1}^{L} c_i$$

2.3.4 Calculation of the dispersion coefficient clustering

One can also apply the calculation of the dispersion over a clustering coefficient. The calculation of the dispersion is a statistical measure used to determine the location of a DNA sequence in relation to another generated as a control group[4]. Initially must be taken to control network, which often consists of a random graph. This network of control varies along its GC content of the sequence to contain only G and C nucleotides[4].

Applying the calculations of the dispersion, one obtains a graph of how the actual DNA sequence resembles a random graph. Figure 5 is a graph which illustrates this method. In the graph, the continuous line represents the random string and the points represent the actual DNA sequence. The calculation of the scattering coefficient can be important for determining the evolution of an organism DNA[4].

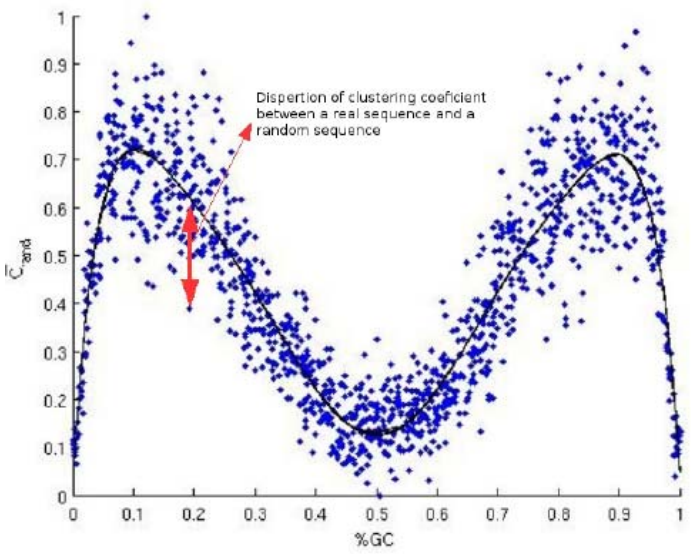

Figure 5: The black curve represents a random sequence of DNA, and the points belong to the actual DNA sequences.

The method of calculation of clustering coefficients is used as an input parameter for calculating the dispersion. From this information, the method calculates the dispersion coefficient D by the sum of the difference between the clustering coefficient of a real graph and the clustering coefficient of a random graph, divided by the standard deviation. This sum is the scattering coefficient of the graph, or the nucleotide sequence with respect to a control sequence. The dispersion coefficient D, used in this work, is defined as[16]:

$$D(C)_L = \frac{1}{n_b} \sum_{i=1}^{n_b} \frac{C_i - C_{rand}}{\sigma_{rand}}$$

where n_b is the number of windows of size L of the sequence analyzed, C_{rand} is the clustering coefficient of the control group and C_i is the clustering coefficient of the graph. In

this context, the standard deviation is C_{rand}, which can be found numerically.

2.3.5 Determination of promoters through a neural network

For certain gene has a gene expression performed correctly, a previous sequence it should be recognized. This sequence is called the promoter, since it promotes or inhibits the transcription of a gene subsequent to it (Lewin, 2001).

Recognize and predict these sequences, difficult to experimentally identified, implies knowing the network of metabolic regulation of a particular organism. Machine learning(ML) techniques are employed to recognize the promoters, among which stand out, artificial neural networks[8]. A Neural Network (NN) is a system inspired by the ML functioning of biological neural networks. NN is considered a distributed parallel processor consisting of simple processing units interconnected or not. These units are called neurons and has a natural propensity for storing experimental knowledge and making it available for use[14].

Can affirm that the RNs learn from examples. An NN is characterized: by the pattern of connections between neurons (called architecture); the method of determining weights in the connections (called training); and its activation function[25]. In the group Bioinformatics UCS uses to NN for prediction and recognition of promoter sequences in bacteria. Neurons(Figure 6) are connected by directed links, each link has a numeric weight W_{ij} associated with it, which determines the intensity and the sign of connection. In addition, each bond has an activation a_j [18]. The function of the input is given by:

$$en_i = \sum_{j=0}^{n} W_{ji} a_j$$

Then, as shown in Figure 7, an activation function that is applied a summation to derive the output:

$$a_i = g(en_i) = g(\sum_{j=0}^{n} W_{ji} a_j)$$

Importantly, there is the inclusion of external parameter of artificial neuron, a $W_{0,i}$, connected to a fixed bias input $a_0 = 1$. The term $W_{0,i}$ set the actual limit for united direction $\sum_{j=0}^{n} W_{ji} a_j$ that exceeds the unit is activated when the weighted sum of "real" $W_{0,i}$ [18] entries.

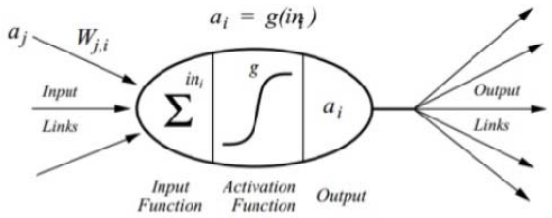

Figure 6: Model of an artificial neuron. The activation of the output unit is a_i and where a_j is the activation of output unit j and W_{ji} is the weight on the link from unit j to that unit[18].

The architecture of the NN used in this implementation is the Multilayer Perceptron. This is characterized by having input neurons, hidden neurons and output neurons. The function of the hidden neurons is to intervene between input and output efficiently. The advantages of adding these is hidden layers increases the number of hypotheses can represent the NN and thus, it is possible to extract higher order statistics. However, when you have an RN with many hidden layers, these are computationally less efficient, since they require a longer processing time[18].

To verify the accuracy of an NN, is used herein, the cross-validation technique or K-fold cross-validation (k-FCV) which is to randomly divide the pattern file into k parts demesmo size. Thus, the generation of files for training and validation occurs. Initially, the promoter sequence represented by nucleotides is divided into 10 equal parts after is translated into numbers, and for each letter is assigned a binary sequence. At the end of the sequence is placed the value 1 indicating that it is a promoter sequence. This process is also performed for a randomly generated sequence, in which case the value 0 is assigned is

not indicating that promoter. These values are used for training and testing of newborns.

After the part k_{th} dividing the promoter sequence is joined to the k_{th} part of the division of generating random sequence input from the k_{th} trial, and so on for all k files tests. As for the training inputs are concatenated all parts minus the k_{th} part of the promoter sequence and all under the k_{th} parts of the random sequence generating the file k_{th} training. This process is performed for each training file. The training and validation steps are repeated k times, being used for training $k - 1$ files and to validate the k_{th} file is not used in training. With each interaction, the validation file has a different k[18].

The computational cost required by these studies is high. Thus, these methods may contribute parallelization to decrease processing time. The use of a HPCA aims to share these problems so that can be run on different computers simultaneously. The main concepts of distributed computing and parallel computing will be presented in the next section.

3. Parallel computing

The bioinformatics tools presented in this article, require high processing capacity mainly due to large amount of data and performing complex calculations. Thus the implementation of these tools on a single computer is impractical, requiring the use of an alternative technology. Among the alternatives, the most appropriate is the parallel computing. Parallel computing aims to split a task into smaller parts and their distribution among different processors working simultaneously, or in parallel. However, these units are synchronized and communicate[12].

Parallel computers can be divided into: architectures with shared memory or distributed memory architectures. The difference between the two is that while the shared memory architecture processing units use a memory space with a single address, the distributed memory architecture each unit has its memory and these are connected through a communication network, as illustrates the image below[24].

3.1. Architecture with Shared Memory

A shared memory architecture refers to the fact that shared memory is a single globally for all processing units[12]. Thus, there is a common memory space used to exchange information between processors, for example multiprocessors. One of the advantages of using shared memory is the direct access to data in memory using only the bus to the traffic information. A disadvantage referred the dispute for access to memory, because all processors may require access to memory simultaneously, which makes the bus a bottleneck. Another disadvantage relates to the expansion system, since with the increase in the number of processors the system can become slow due to increased contention for the bus.

3.2. Architecture with Distributed Memory

On architectures with distributed memory also known as multicomputer, the processing units are independent and each of them has its own memory. These units communicate through a messaging mechanism for a computer network. Therefore they are also called messaging systems[12]. An advantage of this architecture is the easy scalability of the system, because it can increase the capacity of processing just adding computers. Among the main disadvantages are the need to access information from another computer via a network, where latency is high and the bandwidth is low compared to a shared memory environment[12]. The best known examples of architectures with distributed memory are clusters and computational grids.

3.3. Computational Grids

We chose to use this architecture for the tasks to be processed by the methods described in Section 2 are of the bag-of-tasks, i.e. not require communication between them. Thus the computational grids become a good alternative since they are in a high performance platform with low investment. To develop this work we used the GridUCS, which is a computational grid formed by approximately 300 of UCS computers labs. In the following sections we will discuss the main tool used for the management in GridUCS, the OurGrid, and use of this type of platform.

3.3.1 OurGrid

OurGrid is a computational grid of open source tool developed by the Federal University of Campina Grande (UFCG) in partnership with Hewlett-Packard(HP). This is characterized as the use of peer-to-

peer(P2P) technology, and its main purpose is to use the idle time of machines not dedicated to the processing of Bag-of-Tasks tasks, i.e., tasks that are independent and require no communication between them[10][11].

In OurGrid all processing resources belong to OurGrid network, and can be accessed by any user of it[19]. This makes use of Favors policies for the distribution of resources, where the more resources a user to assign more resources it receives network in exchange for those who have used the network. If a user does not do so automatically OurGrid, and gradually withdraw this user priorities, being indebted to the community[19]. OurGrid was the tool used in this work because it is the tool that is used in the computational grid of UCS(GridUCS). It was decided to the use of due OurGrid mainly by simplicity of configuration, management, and use of the same, compared with other management tools computational grids.

4. Implementations and Development

These implementations were adaptations of sequential algorithms of the methods described in Section 2, in order to run in the grid. The entropy calculation methods, frequency of calculation and clustering coefficient have as input a DNA sequence in FASTA format[9] that can be obtained from public repositories. The results generated can be analyzed by experts, or may be used as input for other methods. For example, the output of the clustering coefficient calculation method is used as input to the dispersion method of calculating the clustering coefficient. Already the method of determining promoters through RN has input promoter sequences, which can be obtained by RegulonDB repository[3] and has as output statistical data for further analysis specialists.

4.1. Calculation of entropy, frequency and clustering coefficient

The methods entropy calculation, frequency calculation and calculation of clustering coefficient have the same execution flow for a Grid. Their respective implementations for execution on a computing grid were also similar, and so will be detailed in this section. These methods have as input files in Fast format[9], which generally have a large number of base pairs. Also, often, these methods are applied to multiple input files. Simplified grid operation way is to assign each machine a task.

In this case it can be done by dividing the Fast files into smaller files, or files that contain only part of the main file. After splitting these parts are processed in each grid machine. For the division of the input files was developed a script in Python language. In the list below we has an excerpt of this script. Initially this script lists all Fast files from current directory and then the names of these files are stored in a list (line 1 and line 2). After the list is traversed and the files are divided into smaller parts, where each part is identified with the name of the original and a sequential number to the end. This division is based on the number of rows that each partial file should contain, and this value is a parameter reported to the script.

```
1  lista_diretorio=commands . getoutput( "ls" )
2  lista_separada= lista_diretorio . split( '\n' )
3  n_lin = sys . argv [ 1 ]
4  for  arq_fasta  in lista_separada :
5          if ( arq_fasta [−5:]== ' fasta ' ):
```

After this division is generated the file to be executed on the grid. For the generation of this file was developed another script in Python language. In follow list, there is a stretch of that script. This lists all files resulting from division performed previously (line 2), and each of these files is added to the grid submission file.

```
1  pedacos_fasta=open ( arq_s_ext+ ' . txt ' , 'w+' )
2  for i in range ( 0 , gpos +1) :
3          script_grid . write ( ' task :\n ' )
4          script_grid . write ( '\t '+ ' init :\ t '+ ' put '+ arq _ s _ ext + ' _ '+ str ( i ) + ' . fasta '
                  +      arq _ s _ ext + ' _ '+ str ( i ) + ' . fasta \n ' )
5          script_grid . write ( '\t\t '+ ' put S_dna S_dna\n ' )
6          script_grid . write ( '\t\t '+ ' put script_grid . sh script_grid . sh\n ' )
7          script_grid . write ( '\t '+ ' remote : . / script_grid . sh ' + ' ' + arq _ s _ ext + ' _ '
```

```
                + str ( i ) + '\n ' )
8           script_grid . write ( '\t '+ ' final : get '+arq_s_ext+ ' _ '+ str ( i )+ ' .tar.gz '+
                arq_s_ext+ ' _ '+ str ( i )+ ' . tar . gz\n ' )
9           pedacos _ fasta . write ( arq _ s _ ext+ ' _ '+ str ( i )+ '\n ' )
10  pedacos _ fasta . close ( )
```

In follow list we give an example of a task submission file. The beginning of the file is indicated with the reserved word job, and the name of the run. This name is assigned by the reserved word label (line 2). The snippet of a task to be performed on the grid is initiated by the reserved words task and init (line 3 and line 4). The put command corresponds to the files to be sent to the grid of computers (lines 4, 5 and 6), and the first attribute of the put command match the file name to be sent and the second the name that will receive this file on the remote machine (grid computer). Have the remote command corresponds to the command to be executed in the grid computers (line 7).

Finally, with the final and get commands, files are transferred from the grid machine for submission machine (line 8). At the command get the first attribute matches the file name to be searched in the grid machine, and the second attribute is the name that the file will receive the return.

```
1   job :
2           label : Mauricio
3   task :
4           init : put Kineococcus_radiotolerans_SRS30216_0 . fasta
5   Kineococcus_radiotolerans_SRS30216_0 . fasta
6                   put S_dna S_dna
7                   put script _ grid . sh script _ grid . sh
8           remote :. / script _ grid . sh 4096 Kineococcus_radiotolerans_SRS30216_0
9           final : get Kineococcus_radiotolerans_SRS30216_0 . s
                Kineococcus_radiotolerans_SRS30216_0 . s
```

After the execution of the tasks on the grid another script, also implemented in the Python language, is responsible for uniting all results files. A piece of code responsible for this task is given in list below. Initially you create a directory where the files are stored with the results (line 1). Following are listed all result files that have the name of the original file Fast (line 2). These files are opened and the contents of these is stored in a list where each position of this list corresponds to a row of result files (line 3 line 6). After this result file is removed (line 7). Finally, the list of results is written to an output file, and thus concatenating all result files (lines 8 and 9). At the end of this file is moved to the directory you created to store the results (line 10).

```
1   res=commands . getoutput ( " mkdir resultado " )
2   for i in range ( 0 , n_arq ) :
3           arquivo=open ( arq _ orig+ ' _ '+ str ( i )+ ' _ '+ str ( size )+ ' . s ' , ' r ' )
4           linhas=arquivo . readlines ( )
5           linhas =[ line . strip ( ) for line in linhas ]
6           arquivo . close ( )
7           res=commands . getoutput ( "rm "+arq _ orig+ ' _ '+ str ( i )+ ' _ '+ str ( size )+ ' . s ' )
8           for l in linhas :
9                   saida . write ( l + '\n ' )
10  res=commands . getoutput ( "mv "+arquivo _ orig+ ' _ '+ s t r ( s i z e )+ ' . clu resultado ' )
```

4.2. Calculating the dispersion of the clustering coefficient

The flow of execution of this method is similar to the previous, but with some particularities. One difference lies in the fact that this takes as input the data generated by the clustering coefficient calculation method, not a file in Fast format. However, the main reason for making changes in the source code of the method is that it has as output the average of the dispersion values of each of the graphs. In this case, it was necessary to change it so that each task performed on the grid did not generate as output the average but only the sum of these values. The average will be calculated later.

Initially the file generator script to be submitted on the grid performs the same procedures prior methods but with some differences. First, a division of input files is not performed, since these are not united results of the processing of the clustering coefficient calculation method. In this script, as can be seen in follow code the input files are listed (line 1) and stored (line 2) in a list. After the list is traversed and the input files (.clu extension) are filtered and added to the grid submission file (line 3).

```
1  lista_diretorio =commands . getoutput ( " l s " )
2  lista_separada= lista_diretorio . split ( '\n ' )
3  …
4  script_grid . write ( '\t '+ ' init :\ t '+ ' put '+ arq _ s _ ext + ' . clu ' + arq _ s _ ext + ' . clu\n '
       )
5  …
```

After the processing of tasks on the grid, another script will run (code below) which carries the process of uniting the results. That the resulting values of each file are added, and the end is averaged (scattering coefficient). After the calculated average is written to an output file (line 18).

```
1  total _ col0 =0.0
2  total _ col1 =0 .0
3  total _ linhas =0
4  for i in range ( 0 , n_arq ) :
5          arq _ nlin=open ( arquivo _ orig+ ' _ '+ str ( i )+ ' _ '+ str ( size )+ ' . clu ' , ' r ' )
6          nlin=arq _ nlin . readlines ( )
7          total _ linhas = total _ linhas +len ( nlin )
8          arq _ nlin . close ( )
9          arquivo=open (arquivo_orig+ '_'+ str (i)+ '_'+ str (size)+ ' _ '+ str ( jan )+ ' . s ' , ' r ' )
10         linhas=arquivo . readlines ( )
11         for l in linhas :
12                 ln= l . split ( ' ' )
13                 total _ col0 = total _ col0 + float ( ln [ 0 ] )
14                 total _ col1 = total _ col1 + float ( ln [ 1 ] )
15         arquivo . close ( )
16         res=commands . getoutput ("rm"+arquivo_orig+ '_'+ str ( i )+ ' _ '+ str ( size ) + ' _ '+
               str ( jan )+ ' . s ' )
17 saida=open ( arquivo _ orig+ ' _ '+ str ( size )+ ' _ '+ str ( jan )+ ' . s ' , 'w+ ' )
18 saida . write ( str ( total _ col0 / total _ linhas )+ ' '+ str ( total _ col1 / total _ linhas ) )
```

4.3. Determination promoters using a neural network

This implementation is based on a sequential algorithm already available, which was developed by doctoral student in Biotechnology Program at UCS, Scheila of Avila and Silva, using the R language[15]. This algorithm, the sequential version, has four linked bonds, as seen in code as follow. The outer loop (line 1) refers to the number of neurons in the hidden layer. The subsequent loop (line 2) refers to the network number. The third loop (line 3) refers to the number of times used in NN. The inner loop (line 4) refers to the number of lists initialized (input file). But the command block corresponds to the commands that perform the simulations NN.

```
1  …
2  for Noculto=1 to 8 do
3          for i =1 to 10 do
4                  for j =1 to 30 do
5                          for k=1 to 10
6                                  Bloco de comandos
7  …
```

Since each loop is independent can run each iteration (command block) of these bonds separately. To do this simply perform the iterations in the script responsible for generating the jobs to the grid uploaded files. Thus, it has been the execution of each iteration in different grid computer. In this implementation three

tests were performed. In the first of the two more external loops were divided so as to be distributed on the grid.

In this case the two inner loops are executed in each grid machine. In the second test only the innermost loop was kept to be run on each grid machine. So divided the three most external ties, to run in a distributed way. The last test was divided four bonds to run in a distributed way, thus keeping only the command block NB responsible for performing each grid machine. For the distribution of tasks was implemented a script written in the Python language, and in this code we has an excerpt of this script.

```
1   …
2   for oculto in range ( 1 , 9 ) :
3           for i in range ( 1 , 11 ) :
4                   for j in range ( 1 , 31 ) :
5                           for k in range ( 1 , 11 ) :
6                                   iteracoes = j*5
7                                   script_grid . write ( ' task :\n ' )
8                                   script_grid . write ( '\t '+ ' init :\ t '+ ' put
                                            TreinoRNDGProm_Sigma70Aleat1
                                            TreinoRNDGProm_Sigma70Aleat1\n ' )
9                                   script _ grid . write ( '\t\t '+ ' put
                                            TesteRNDGProm_Sigma70Aleat1
                                            TesteRNDGProm_Sigma70Aleat1\n ' )
10                                  …
11                                  script _ grid . write ( '\t\t '+ ' put script _ grid . sh
                                            script _ grid . sh\n ' )
12                                  script _ grid . write ( '\t\t '+ ' put Script . R Script . R\n '
                                            )
13                                  script _ grid . write ( '\t '+ ' remote : . / script _ grid . sh'
                                            + str ( oculto ) + ' ' + str ( i ) + ' '+ str (
                                            iteracoes ) + ' ' + str (K) + '\n ' )
14                                  script _ grid . write ( '\t '+ ' final : get arquivo_ '+ str (
                                            oculto ) + ' _ '+ str ( i ) + ' _ '+ str ( iteracoes ) + ' _
                                            ' + str ( k ) + ' . tar . gz ' + ' arquivo_ '+ str (
                                            oculto ) + ' _ '+ str ( i ) + ' _ '+ str ( iteracoes ) + ' _
                                            ' + str ( k ) + ' . tar . gz\n ' )
15  …
```

The algorithm execution R in each grid computer is done via a script written using the Shell Script language. This is based on measuring the number of bonds to be partitioned and the end that compresses the files obtained from the execution of the NN. These files have the NN hit rate, that is, values between 0 and 1, which correspond to the likelihood that the DNA sequence is a promoter or not. It is also generated the average quadratic error in order to verify the quality of the results. In follow code we have the code running on each grid machine.

```
1   /opt/R 2.9.0/ bin/R−−file = Script . R−−args $1 $2 $3 $4
2   tar −czf arquivo_$1_$2_$3_$4 . tar . gz *. t x t
```

5. Results

For testing the implementations was used the Griducs which consists of a existing institutional grid in the UCS. This is formed by approximately 300 computers not dedicated, there are, computers that have the primary purpose use in teaching activities in undergraduate and Graduate courses at UCS. These computers have 3 operating systems with the necessary tools to provide features for the OurGrid. To fulfill the entropy calculation methods, frequency, coefficient clustering and dispersion of the clustering coefficient were used as input all matching files Fast species of Kingdom Bacteria and Fungi Kingdom available at NCBI until the date of October 26, 2009[9]. For the prediction method of an NN by promoters

were used in all available promoters RegulonDB [3] associated with Sigma70 (sedimentation weight) to the same date.

For the analysis of developed implementations calculated the speed-up and efficiency of the developed implementations. The speed-up(S_p) aims to demonstrate how the parallel execution is faster than the sequential execution and its calculation is done by dividing the sequential time (T s) by the parallel time(T_p) as follows T_s/T_p. The ideal speed-up is achieved when your result is equal to the number of machines ($S_{p=p}$). Since the efficiency refers to the percentage of use of the processors in the execution, this value ranges from 0 to 1, and is calculated by dividing the speed-up (S_p) by the number of processors (P) used as follows

$S_{p/p}$.

In Figure 7 there is the sequential and the parallel long time methods. The sequential time is an estimate based on the sum of all tasks performed on the grid. We opted for the calculation of this estimate as the sequential execution of all methods with a single computer was impossible. In tests of entropy calculations, periodicity, and clustering coefficient were used 177 machines. As for calculating the dispersion of the clustering coefficient were used 142 machines. The number of machines used in these tests correspond to the number of machines available on the grid at the time of testing. For the prediction of promoters through an NN were used 80 machines since this was the maximum number of tasks.

For calculation of the entropy can be seen that the sequence time is a little higher than the parallel time. As can be seen in Figure 8, the speed-up obtained in this method is only 4.49, and as can be seen in Figure 9 has an efficiency of only 0.025. This is due to the fact that the time spent in the execution phase of each task, on average, of 1.3 seconds, since the data transfer time for each task is 2 seconds on average, so it has been a high transfer time compared to the runtime, which results in poor performance of the developed implementation.

In the method for calculating periodicity can be observed in Figure 7 that the time sequence is much higher than the parallel time, so there is a significant improvement in processing time. In Figure 8 it can be seen that the speed-up obtained in this method is 137.96, which means a great improvement during the parallel execution in the sequential relation. It can be seen from Figure 9 that have an efficiency of 0.779 which means that a high percentage of resources of each execution of the computer grid was used. This is due to the fact that this method uses 0.8 seconds of data transfer for each task, which is low compared to 205/2 used to perform each task.

As for calculating the clustering coefficient, as can be seen in Figure 7, there is a significant improvement in the time of the parallel processing method related sequence. In Figure 8 it can be seen that the speed-up of this method is 126.87. In the Figure 9 it can be seen that the efficiency is also high with a value of 0.716. In this case, each task processing time is 92 seconds, the data transfer time 1.2 seconds. For clustering coefficient dispersion method as viewed in Figure 7 the parallel execution time is greater than the sequential execution time. As can be seen in Figure 8.

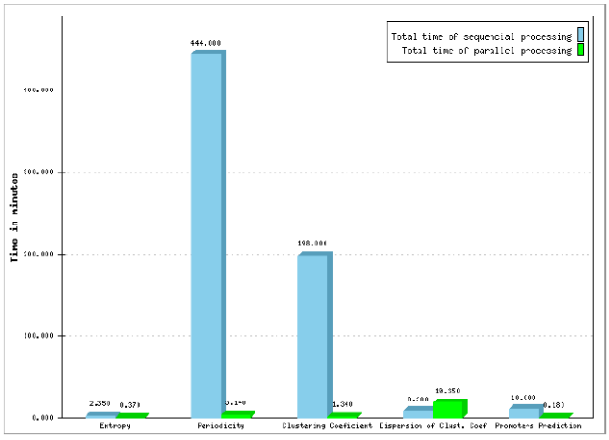

Figure 7: Comparation of sequencial and parallel processing

The speed up obtained in this method is only 0.43, and as can be seen in Figure 9 has an efficiency of

only 0.003. This can be explained because the data transfer time to each machine is 1.5 seconds, very high compared to only 0.6 second execution time for each task, so has a very high transfer time data. This implementation could be improved by running larger files, i.e. the division of the original Fast files in larger files. Thus, reducing the number of tasks execution and increasing processing time required for each task in the grid nodes.

For the promoters prediction method via a RN, as can be seen in Figure 7 the parallel execution time is considerably shorter than the sequential execution time. In Figure 8 and Figure 9 it can be seen that the speed-up and the efficiency of this method are 33.66 and 0.420, respectively. This method achieved good results because the data transfer time is 29 seconds, lower than execution, which is 45 seconds. In this method were made three tests. But two tests, the parallelization of loops 3 and the parallelization of loops 4 showed very high time to results, and in this case we chose to abort the execution. In this case, there is a file transfer time (sending and receiving) higher than the run time.

The prediction method of promoters through a NN was the subject of a search coordinated by Prof. Dr. Sergio Echeverrigaray UCS Biology Center. This research resulted in the participation of the undergraduate student Mauricio Adami Mariani, author of this work, in the seventeenth event Meeting of Young Researchers of UCS 2009 as young researcher. The research was titled: "Using Computational Grids for parallelization of a machine learning algorithm"[2]. This also had the participation of Prof. PhD Gunther JL Gerhardt, Prof. PhD Scheila of Avila and Silva and Prof. PhD. Andre Luis Martinotto.

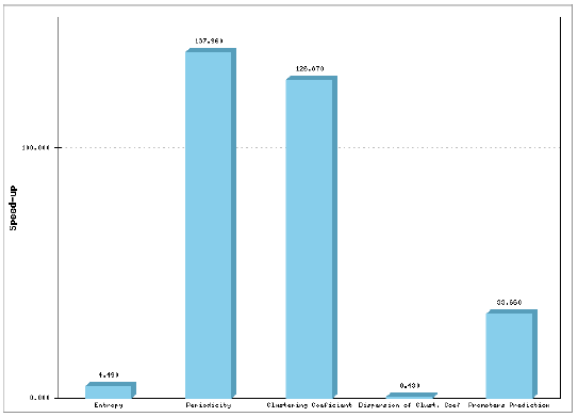

Figure 8: Speed-up of parallel codes

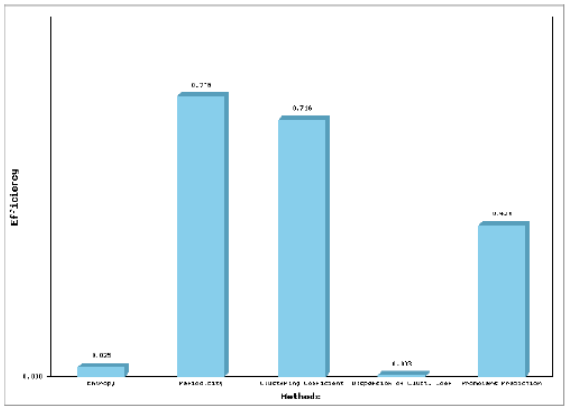

Figure 9: Efficiency of each parallel implementation

6. Conclusions

In this work we studied basics of molecular biology and bioinformatics methods. The area of biology has a large field of research and a lot of data to be processed. With the aid of these computing tasks can be accomplished in a more quick and efficient. This study was conducted with the aim of using these methods in a high performance environment. It was decided by computational grids such an alternative for

obtaining a high computing power at low cost. For parallelization of the calculation of entropy, calculation of frequency, calculation of clustering coefficient and calculation of dispersion of clustering coefficient was chosen split the Fast files used as input. As for the promoters prediction method through a NN implementation methodology consisted in the distribution of the sequential algorithm with ties.

Of the three parallel implementations of these developed implementations (frequency calculation, calculation of the clustering coefficient and prediction of promoters with an NN) were far faster than their respective sequential executions. An alternative to further reduce the processing time of the two methods in those(frequency calculation and calculation coefficient clustering) would be the increase in the computational grid customers. The third method that achieved improvement in their processing time (prediction of promoters with an NN), this improvement obtained by distributing two loops, creating 80 jobs, as mentioned in Section above, even a distribution of 3:04 ties that make up the sequential program, but these obtained very high processing times, if aborting them their executions.

Finally the methods calculation of entropy and dispersion of calculating of cluster coefficient did not achieve good results, with no significant improvements in their respective processing times or even lower performance. These longer used for transferring the data to the grid computers in the processing sequence.

6.1. Future works

This study aimed to assist research in bioinformatics UCS. From the developed implementations sought to reduce the processing time of some methods used in this field. Bioinformatics is an area that has several methods that require high-performance processing. So we can list some possibilities jobs future following:

- Adaptation of other methods of bioinformatics for HPCA.
- The GridUCS expansion through the use of computers that are not located in the UCS, but geographically dispersed or provided by volunteers.
- Creating a web environment that allows the availability of the tools developed so they can be used for real-time processing.
- Creating a web environment for the provision of the results generated by plays that work.

References

[1.] ANDRADE, N.;COSTA, L .;GERMÓGLIO, G.; CIRNE, W.; Peer-to-peer grid computing with the OurGrid Community. Universidade Federal de Campina Grande, Campina Grande, 2005.

[2.] ANDRADE, N.; CIRNE W.; BRASILEIRO, F.; OurGrid: An Approach to Easily Assemble Grids with Equitable Resource Sharing. Federal University of Campina Grande, Campina Grande, 2003.

[3.] BUYYA, R. High Performance Cluster Computing: Architectures and Systems. [S.l.]: Prentice Hall, 1999.

[4.] CIRNE, W.; NETO, E. S.; Grids Computacionais: Da Computação de Alto Desempenho a Serviços Sob Demanda. Fortaleza, CE: SBC, Federal University of Ceara, State University of Ceara, 2005.

[5.] DANTAS, M. Computacão distribuída de alto desempenho. Rio de Janeiro: Axcel Books, 2005.

[6.] FARACH, M.; NOORDEWIER M.; SAVARI S.; SHEPP L.; WYNER A.; ZIV J.; On the entropy of DNA: Algorithms and measurements based on memory and rapid convergence. Proc. 5th Annual ACM-SIAM symposium on Discrete Algorithms; ACM-SIAM, 1994.

[7.] FOSTER Ian. Designing and Building Parallel Programs. 1. ed. Reading, USA: Addison Wesley, 1995.

[8.] GERHARDT ,G. J.L.; LEMKE, N.; CORSO,G.;Network clustering coefficient approach to DNA sequence analysis; Paper published in Chaos, Solitons and Fractals, 2005;

[9.] GERHARDT ,G. J. L.; PANIS, R. J.; SANTOS, L. Presença de Períodos em Sequências de DNA. Caxias do Sul: UCS, Artigo não publicado, ano 2004.

[10.] GERHARDT, G. J. L., SILVA, S. de A.; PANIS, R. J.; SANTOS, L. dos; Correlações entre Cromossomos Usando Periodicidades em Seqüências de DNA. II Workshop of Technology in Computer Applied at Natural Enviroment; Publicado em 2004.

[11.] GIBAS, C.; JAMBECK, P.; Developing Bioinformatics Computer Skills; Estados Unidos, O'Reilly, 2001.

[12.] HAYKIN, S.. Neural networks: a comprehensive foundation. 2. ed. New Jersey: Prentice-Hall, 2005.

[13.] HORTA, J. O. C.; Estimadores de Entropia para Sequências de DNA; 2001; 144p. Dissertation (Masters dissertation in Computer Applied) - University of Sao Paulo, São Paulo.

[14.] JACOB, B.; BROWN, M.; FUKUI, K.; TRIVEDI, N. Introduction to Grid Computing. , 2005. Disponvel em: http://www.redbooks.ibm.com/abstracts/sg246778.html. Access in: october. 2009.

[15.] KONIGES, A. E.; Industrial Strength Parallel Computing; San Francisco, California, Morgan Kaufmann Publishers, 2000.

[16.] LESK, Arthur M., Introdução à Bioinformática, 2a Ed.- Porto Alegre: Artmed, 2008.

[17.] LEWIN, B.; Genes VII; 1.ed.; Porto Alegre, Artmed, 2001.

[18.] MARIANI, M. A. ,GERHARDT, G. J. L., SILVA, S. de A.;MARTINOTTO, A. L., ECHEVER-RIGARAY, S.; Utilização de Grids Computacionais para a Paralelização de um Algoritmo de Aprendizado de Máquina; XVII Encontro de Jovens Pesquisadores da UCS; 009.

[19.] MOUNT, David W. Bioinformatics : Sequence and Genome Analysis. New York: Cold Spring Harbor Laboratory, 2000.

[20.] NELSON, D. L.; COX, M. M.; Lehninger Princípios de Bioquímica.; 3.ed.; São Paulo, Sarvier, 2002.

[21.] Regulon DB. Disponvel em: <http://regulondb.ccg.unam.mx>. Access in: october. 2009.

[22.] RUSSELL, S.; NORVIG, P.; Inteligencia Artificial; Rio de Janeiro. Elsevier. 2004.

[23.] SANTOS, L. dos;Caracterização Computacional de Padrões Estruturais em Sequências de DNA Relacionadas a Processos em Redes Metabólicas; 2009; 127p.; Dissertation(Masters dissertation in Computer Applied) – National Institute of Space Research(INPE), São José dos Campos.

[24.] SEEFELD, K.; R For Bioinformatics; OREILLY & ASSOC; 2005

[25.] SHANNON, C.; WEAVER, W. The Mathematical theory of communication. 5 ed. Urbana/Chicago, Illinois State University Press, 1963

[26.] SILVA, S. de A.; Redes Neurais Artificiais Aplicadas na Caracterização e Predição de Regiões Promotoras; 2006; 144 p.; Dissertation (Masters dissertation in Computer Applied) - University of Vale dos Sinos(UNISINOS), São Leopoldo.

[27.] TANENBAUM, A. S.;Organização Estruturada de Computadores; Rio de Janeiro, RJ, Livros Técnicos e Científicos Editora, 2007.

[28.] VOET, D.; VOET J. G.; Bioquímica; 3.ed; Porto Alegre, Artmed, 2006.

[29.] WHEELER, David L.; BARRET, Tanya; BENSON, Dennis A.; BRYANT, Stephen H.; Canese, Kathi; CHETVERNIN, Vyacheslav; CHURCH, Deanna M.; DICUCCIO, Michael; EDGAR, Ron; FEDERHEN, Scott; GEER, Lewis Y.; HELMBERG, Wolfgang; KAPUSTIN, Yuri; KENTON, David L.; KHOVAYKO, Oleg; LIPMAN, David J.; MADDEN, Thomas L.; MAGLOTT, James Ostell; PRUITT, Kim D.; SCHULER, Gregory D.; SCHRIML, Lynn M.; SEQUEIRA, Edwin; SHERRY, Stephen T.; SIROTKIN, Karl; SOUVOROV, Alexandre; STARCHENKO, Grigory; SUZEK, Tubga O.; TATUSOV, Roman; TATUSOVA, Tatiana A.; WAGNER, Lukas; YASCHENKO, Eugene. Database resources of the National Center for Biotechnology Information. Nucleic Acids Research, v. 34, 2006.

An approach of implementing Application-as-a-Service (AaaS) model with Open-Source Applications

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Abstract

Application as a Service (AaaS) is a service component of Cloud computing that falls in the category Software as a Service (SaaS). This paper presents an Application as a Service (AaaS) model using Open Source applications for File Sync, Share and Email solution for organizations. The proposed model enables the organizations to manage all computing resources involved totally by the service provider or by the company itself and the applications are facilitated as service on demand. The target group of the model developed is small organizations running in private cloud environment. We analyzed the common requirements of small scale organizations and that triggered us to develop an AaaS Service model with Open Source applications. This approach enables the organizations easy migration with minimal effort and with least cost.

Keywords*: Application as a Service (AaaS), Open-Source Application, Application Services*

Introduction

Applications as a Service (AaaS) is a cloud service where the model ensures delivery of computer software applications as a service to its users online i.e. via the Internet or Intranet. This type of software falls under one of the main core service - Software as a Service (SaaS). This approach of providing software as a service to the users is also known in the market as on-demand software. AaaS or on-demand software is becoming strong and a prominent entity in the software market due to its economical offering and efficiency that it can offer to organizations - big or small regardless. The approach of providing single software to multiple users confirms financial benefits to organizations by getting rid of the expenditure of individual user licenses and in the same time cutting the procurement, setup and operating cost of the hardware associated. As in AaaS model a software can be provided to multiple users simultaneously from a single point the efficiency is ensured both in the provider end and in the user end. This distribution is done through the Internet. There are different types of functions involved that are provided to the user and few to mention are: management of user accounts, provisioning of users, user subscription management and life cycle management of application. All these functions collectively make AaaS model a highly efficient and financially economical way to deliver software to small scale enterprise users. This approach is also effective for large organization within a private could environment.

Many Organizations use cloud based services to share valuable and confidential data within different departments of the organization and also in the same time with different entities outside of the organization. This type of services falls under the AaaS Cloud service and generally this services are rendered to the user by Companies that provide applications as a service (on-demand software). This type of provider are known as ASP or application service provider. ASPs own the software that they deliver to users and the users are billed based on use of the service. Even though this services are cost effective still for many organizations it is not possible to effort the services provided by the ASP due to financial shortcomings. ASPs bill on a per use basis during a month or can be billed in yearly basis and the approach thus makes software on demand. Our effort in this article is to present an AaaS Solution with Open Source applications, so that there is no charges involved for using the

applications. Many organizations that wants to avail AaaS cloud services with no monthly cost involvement can adopt our solution. An important feature of this solution is that it is developed completely with Open Source applications and so only cost involved is for a small number of low cost hardware. For companies who are already running computer network can use the existing hardware in most cases which implies hardly any new expense to migrate to the proposed cloud services. Obviously being an Open Source application solution it is not that all services will be available in the solution but it will provide most commonly used applications by an organization. Our proposed model covers the following service applications: Office, Multimedia, Imaging, Email, Calendar, Contacts and File Manager. Apart from all those mentioned it offers few other services – Activity Log, Bookmarks and Data Usage Summery. The solution has been developed and the beta version has been running on test basis for Quantum Foundation of Bangladesh and is discussed later in the article.

Types of Application Service Providers (ASPs)

ASPs are divided into 4 major categories and is discussed in brief as stated below:

Specialist or Functional ASPs – this type of ASP is the one who provide a single application (e.g. solution for payroll of a company) to the client.

Vertical Market ASPs – provides a specific sets of software applications for a specific type of industry (e.g. application services for food service industry)

Enterprise ASPs – who provide customized applications for management of multiple functions within a single organization.

Local ASPs – who provide a variety of applications to small businesses in specific small geographical area.

Where does AaaS stands in Cloud Computing

Cloud computing is viewed as one of the most promising technologies in computing today. In the recent few years there have been significant development achieved in the IT industry especially in the field of virtualization techniques which triggered to more reliable services in cloud computing. Cloud computing concept and virtualization techniques together ensured cloud based services more affordable and as a result many organizations are leaning to this cloud service. Cloud computing solutions include IT infrastructure, development platforms and software.

IT Infrastructure (IaaS): The infrastructure of a cloud network is known as Infrastructure as a Service (IaaS). This service provides with the capability to provision processing, storage, networks, and other fundamental computing resources and with all these resources the user is able to deploy and run arbitrary software, which can include operating systems and applications.

Development Platform: This service is known as Platform as a Service (PaaS). PaaS is a cloud computing model that provides the user with software and applications over the Internet. In this model a Cloud Service Provider (CSP) delivers hardware and software tools as a service to the users particularly for application development. All the resources are hosted in the provider's side and as a result PaaS ensures no in-house hardware and software to develop.

Software: This service is known as Software as a Service (SaaS). SaaS is a software delivery method that provides access to software and its functions from any location through the Internet/Intranet. This service gives the user of the luxury of using expensive software with a fraction cost as SaaS pricing is based on a monthly fee with the fact that fact that the uses do not need any hardware as the software is hosted remotely in the providers end. From this point of view SaaS is also considered as Hosted Applications. The hosted applications are arranged by the ASPs to provide services to the clients as Application as a Service (AaaS).

Proposed AaaS Architecture

As part of our AaaS architecture, we defined a model that shows how the system behaves from a user-centered design perspective. Our model is as shown in figure 1 below. AaaS for a particular application and for any integration work needed to deliver the service within this frame. The SaaS specialist is the technical resource who delivers any personalization, programming, and customization for it.

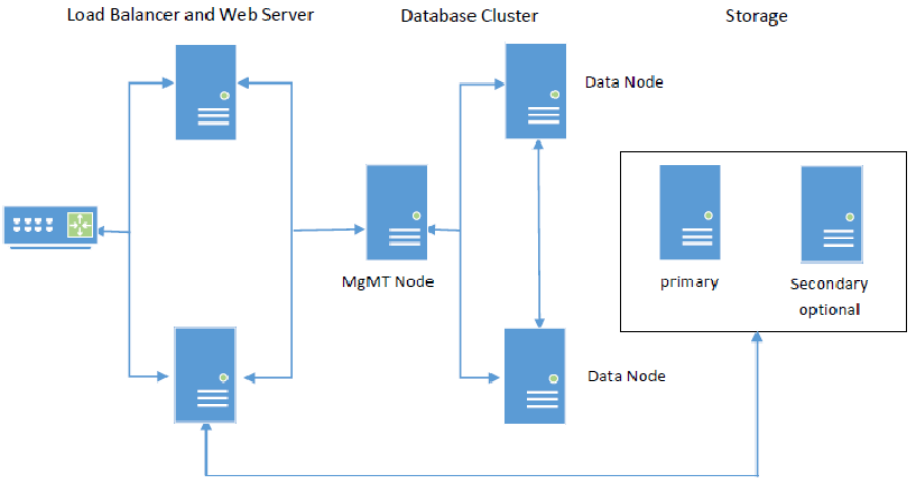

Figure 1: Cloud based Network Architecture for providing Application Service

In the model developed when a file share request is received the router sent the request to the load balancer and the load balancer forward it to the Management Node. After the request is further processed it is directed to the Data Node for appropriate interpretation in the database. Based on the request data is processed for retrieval to the user request point or in if required it is stored in the storage.

Conceptual Architecture

The conceptual architecture in figure 2 explains all the key capabilities required in the architecture designed, the logical separation of capabilities into tiers, and the logical set of services with varying capabilities. We do not expect that individual SaaS applications will necessarily include every service described in the conceptual architecture.

In the environment all the features are controlled by the IT Administrator who controls the whole environment. The attributes may by different based on the type of organization and depending on the nature of operation of the organization.

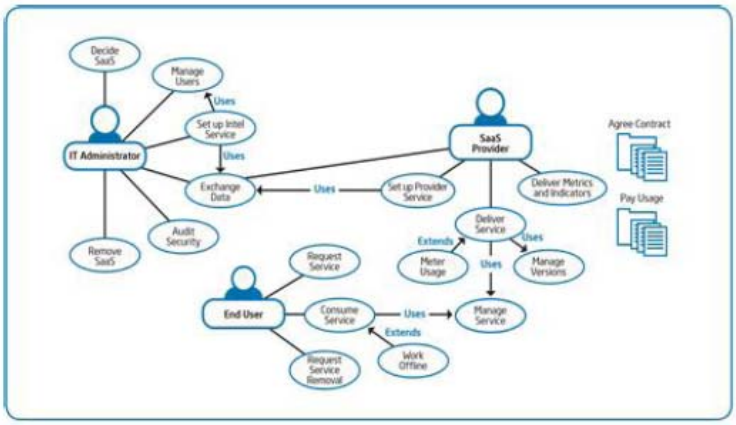

Figure 2. Software as a service (SaaS) architecture use-case model

Therefore, the administrator needs to set the types of attributes necessary to run various operations involved. Once the administrator sets the policy as per requirement it is provided by the SaaS provider and once data is processed it is made available to the End User. Security is a major concern in any cloud environment. This is ensured by the IT Administrator assessing the risk factors based in the environment and using various IT Policies.

Proposed Applications in the AaaS model

Office Application Service: Word processing and Presentation, graphics and databases are the applications provided in this category. All the applications in this category can open and edit documents. In our model for word processing **Documents 0.9.1** application service is considered.

Multimedia Service: Multimedia means representation of digital information in the form of audio, video, and animation. Information can be represented, stored, transmitted and processed digitally. When it comes to the term multimedia application it implies a collection of different types of text, graphics, images, audio and video. In our model for video processing we used **videoJS subline 0.9.5** application and audio processing we used **mp3 player 1.2.5** application.

Image Service: Image service allows display and analysis of image files. Most common features of this service includes querying, processing, previewing, downloading and adding. All those tasks mentioned are controlled through a set of image service parameter settings. For all image processing in our solution it is handled by **gallery +14.3.0** application.

Email Service: Email service is yet another essential service. This service provides webmail service to the user on-the-fly in any mobile device anywhere through Internet. Multiple accounts can be used in parallel and all the mailboxes are protected appropriate security features. Depending on the solution both POP and IMAP feature can be supported in the service provided. In our model for email read, compose, send and use other email related options we used mail template app. Email service is ensured using **postfix 2.10.0** application.

Calendar Service: Calendar service is a very important application. It is a fast, effective tool for managing schedules. It keeps track of the upcoming appointments and keep the user on the track. Different calendar applications have different types of features like alarm for events, travel information, flight schedule, meetings, task management, schedule deliverables are some to mention. Calendar apps are becoming smarter and more functional. In our model for calendar service we used calendar app. **calendar 0.6.6** application is used in our model to facilitate all the calendar features.

Contact Service: Contact service is the one that manages contacts and keep us connected with people. Contact app enables user to sort contact category wise, query contact, add and edit contacts, create group contacts, speed dial option from contact list, add/edit contacts with pictures etc. In our model for contact service we used contact app. In the model developed **Contacts 0.5.0.0** application is used to manage all contact related features.

Activity: This service provides update and information of all activities associated with a user‘s files, such as sharing activity, updated, renamed, deleted and removed files. In our model for activity service we used **activity 3.4.5** application.

Bookmarks: Bookmark service is an application that provides the user with the option of saving a webpage address. Frequently browsed web addresses can be saved and that expedite the browsing service more effective as data retrieval from some specific website is accessible faster. In our model for bookmarks app we used **bookmarks 0.02.45** application.

Usage: Data usage monitoring is curtail for some organizations. Storage space is expensive and this is the usage service which up to date information on space being used by the user and that enable the user to manage files as per limit provided. In our model for usage check we used **storage chart 3.4.5** application.

Case Study (Quantum Foundation of Bangladesh)

Quantum Foundation of Bangladesh is a non-profitable organization that provides various types of training to its members. At the moment it has approximately 100000 members. They used to share ideas on training methods and materials through regular email and by meetings. We realized that if the solution we developed is implemented for them it could make the operation of the organization much easier. In this norm we proposed them to allow us to implement the system for them. They had been using server based network for file sharing. They had been using personal computer as well though internet and intranet. So, we used their existing infrastructure and implemented the design developed using the open source applications that we discussed in previous section. The applications that they are using at this time are office services, multimedia, imaging, email, calendar, contacts and activities. The applications are accessible from various client devices, through a thin client interface, such as a web browser (e.g. web-based e-mail). The members does not manage or control the underlying cloud infrastructure which includes server frames, work stations, software, storage, routers/switches and as well individual user specific application capabilities and configuration settings. The portal developed can be found at www.cloud.qmail.com.bd

Conclusion

The organizations that is adopting AaaS solution must consider the flexibility and risk management factors in reflection to their portfolios of IT services and the IT Infrastructure. AaaS clients need to consider the quality of the account monitoring tools a cloud AaaS provider makes available for the services it delivers. Even though the AaaS model is developed with a set of Open Source applications the user still should have the ability to determine when they have exceed their monthly usage limit for their subscription level. Clients should also have the ability to monitor the usage of individual users on an hourly basis and depending on daily basis so that data sync operation is not interrupted in time of need. The model developed indicates lack of administrative tools which may lead to data scare situation. Therefore, an effective administrative monitoring mechanism needs to be developed in the next level development. Another point that needs more attention is the authentication screen, even though it is ensured in the current version the templates needs to be improved which will be open for the next development. Many organizations use cloud-based services to share sensitive company data within the group members and in some cases with different vendors, partners and also at time with. They sync data with their workstations, personal devices and home computers, all in an effort to manage data with ease and with an efficient process – all without any intervention of IT's oversight. With the system developed one can effectively manage and protect data sets involved by hosting own solution on site, using own IT Infrastructure. This may not be suitable to hybrid could scenario but definitely a robust and efficient AaaS model for private cloud scenario.

References

[1.] Alberto Heredia, Ricardo Colomo-Palacios, Antonio de Amescua, "Software Business Models from a distribution perspective: A Systematic Mapping Study", Conference on ENTERprise Information Systems / International Conference on Project MANagement / Conference on Health and Social Care Information Systems and Technologies, CENTERIS / ProjMAN / HCist 2015 October 7-9, 2015

[2.] Björn Johansson, Pedro Ruivo, Jorge Rodrigues, "Adoption Reasons for Enterprise Systems as a Service - A Recap of Provider Perspectives", Conference on ENTERprise Information Systems / International Conference on Project MANagement / Conference on Health and Social Care Information Systems and Technologies, CENTERIS / ProjMAN / HCist 2015 October 7-9, 2015

[3.] Chou, W 2008,"Web Services: Software-as-a-Service (SaaS) Communicaton and Beyond", IEEE Congress on Services.

[4.] E. Naone, Technology overview, conjuring clouds, MIT Technology Review, July–August, 2009.

[5.] http://apprenda.com/library/software-on-demand/applications-as-a-service/

[6.] https://azure.microsoft.com/en-us/documentation/articles/choose-web-site-cloud-service-vm/
[7.] https://devcentral.f5.com/articles/f5-synthesis-delivering-web-application-security-in-the-cloud-as-a-service
[8.] http://www.intel.com/content/www/us/en/cloud-computing/cloud-computing-intel-it-architecting-software-as-a-service-paper.html
[9.] https://owncloud.com/owncloud-architecture-overview/
[10.] Mobarak Hossain holds B.Sc. in Software Engineering, He was a scientist trainee at Daimler Chrysler in Bangalore, India. He has been involved in research projects in Cloud Computing in the area of OpenStack Cloud Platform and Cloud Virtualization Techniques.
[11.] National Institute of Standards and Technology, The NIST Definition of Cloud Computing, Information Technology Laboratory, 2009.
[12.] Kulkarni, G, Gambhir, J &Palwe, R 2012, "Cloud Computing-Software As Service", International Journal of Cloud Computing And Services Science, Vol. 1, No. 1, pp.11-16.
[13.] Rajkumar, B. Yeo, C. Venugopal, S. Malpani, S. Cloud computing and emerging IT platforms: vision, hype, and reality for delivering computing as the 5thutility, Future Generation Computer Systems (2009).
[14.] Reese, G. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, in: Theory in Practice, O'Reilly Media, 2009.
[15.] Ruivo, P., V. Santos, and T. Oliveira, Data protection in services and support roles - a qualitative research amongst ICT professionals. Procedia Technology 2014. 9: p. 94-99.
[16.] Satyanarayana, S 2012, "CLOUD COMPUTING: SAAS", Journal of Computer Science and Telecommunications, Vol. 4, No. 4, pp. 76-79.
[17.] Seethamraju, R., Adoption of Software as a Service (SaaS) Enterprise Resource Planning (ERP) Systems in Small and Medium Sized Enterprises (SMEs). Information Systems Frontiers, 2014. 8: p. 1-18.
[18.] Shahed Murshed holds a B.Sc. in Computer Science (Computer Engineering), an M.Eng in Internetworking and is currently pursuing Ph.D. in Computer Science at the Texila American University, School of Information Technology. He has been involved in research projects in Cloud Computing in the area of OpenStack Cloud Platform, IaaS Network Infrastructure development and virtualization in Cloud Computing.
[19.] Stanoevska-Slabeva, K. Wozniak, T. Grid and Cloud Computing-A Business Perspective on Technology and Applications, Springer-Verlag, Berlin, Heidelberg, 2010.

Mike Assistant Android App

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Introduction

Mike Assistant software is still under technical preview stage of development, but the purpose of this Documentation is to provide simple and graphics explanations on how the software operate, look like and how it was created.

Each part describes some details of the software and the currently graphical user Interface of the Software by means of text and enough pictures. The graphic contents are subjected to change at any time and so will the functionality since the software is actively being worked on.

This document may not provide all the information about the software but it may help to provide basic understand on what a software can do and hence enabling readers to take advantage of it once they get the need of the software.

Acknowledgement

The succession of this project was due to direct and indirect support which I got from various individuals and organizations who I would also like to acknowledge.

Firstly I would like to thank my thank Emmanuel Meena my student who was helping to implement the idea of creating a software. Also I thank all my students of Loyola High School, Tanzania who are fulfilling my dreams of creating hardware and software like Automatic Attendance taker, Automatic Class room locker, Robotics Line follower and many software. May God bless all my students and fulfill their hearts desire.

About

Not all time we can attend our phone calls, but switching to silence mode or switching off our phones will make us miss important phone calls sometime, switching to vibrate mode may cause lack of concentration on what we do.

Luckily mike assistant can do it better

Mike assistant is the software developed by a young computer science student, Emmanuel Gerald Meena under the guidance of Sr. Maria the teacher of computer Science, with the aim of facilitating productivity and easy of accessibility to officers of a certain organization together with other individuals who will seem to be effective users of their mobile phones on matter related to communication. Application Reality:

In Hospitals:

If there is an accident happened on the road when the doctor is on another call, the mike will assist them by referring another doctor.

In Schools:

The representative of the Headmaster can be reached through his phone by the students, teachers and the parents

In a Company:

His Assistant can be approached when he or she is busy with meeting or something.

App goal

The software was created to enable people to get necessary information in case the targeted individual is at emergency; this will enable Managers to direct calls to their assistant in case of emergency.

The software ultimate goal was to enable the callers to automatically get information concerning their target and to be directed to another person who can assist them, instead of having empty response, in other way the app will provide room for the user not to be disturbed by anyone who calls them when they are busy with other activities.

Although the user will be able to call everyone he wishes but he may not be able to attend all phone calls since most of them will not be heard except for the calls from their favorites which will always vibrate the user phone. This was all aimed to make sure that the user of the app can be accessed in case of unavoidable task which he will have to attend.

Technical details

Large part of the software was written in java programming language using core Java 7 Standard edition libraries without utilization of any libraries or API's from any company except for API's which are pro-vided with Java Software Development Kit. Since the software development was for android, the software used API's which are provided by Android Software Development Kit without utilization of API's from other companies, all required functionality and feature was designed by the developer of this app, this was all aimed at increasing reliability to the software as each component is fully tested and assured to run for a life time.

Version

The bottom right of the splash screen displays the word technical preview which is the current development stage, since the software as for the time of writing this document is still on the technology preview stage of development.

As the software is still being reviewed for the final release which can be relied upon. We hope that the software under this stage will be working as intended to, and we do welcome any kind of suggestion from our users of this app

Splash Screen

The splash screen displays the letter **"a"** in a certain style, which is the shortening of the word **("aika")** which means **"Thank You"** as the first desired name of the app was **"aika rose"** which meant thank you rose " **where Rose** " is the name of developer's mother .

The name of the app was later changed to mike assistant while still retaining the letter **"a"** for the shortening of the word **"assistant**".

The splash screen is designed to be displayed for two seconds after which it will terminate and launch the app. The fate of splash screen under technology preview is not to decorate the app, but to provide room for future modification of the app



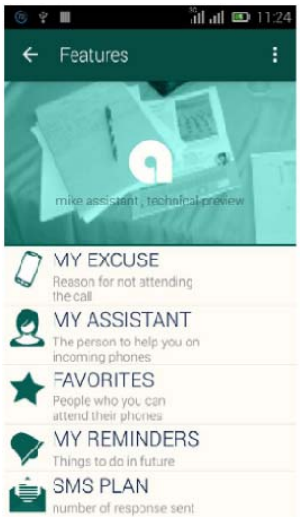
Features

The features of mike assistant app are as follows

- My excuse, My assistant, Favorites, My reminder, SMS plan

Later pages will provide detailed explanation about each item which is on the Feature Screen.

The image which is displayed on the feature screen shows a pen and notebooks all symbolize working state of the user, though the users of this app are not only students or people who are busy with pen and paper but image was used to represent working state



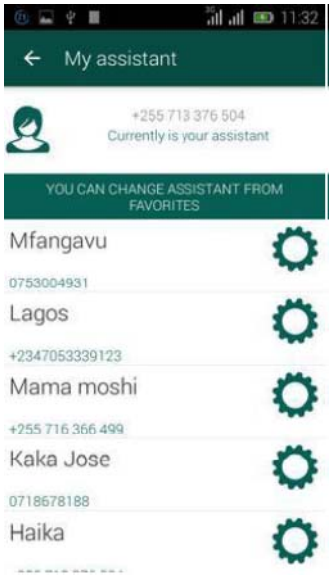
My Excuse

Why not attending phone calls?, Here the user of this app will have to write the reason for him not to attend a phone call, Once the excuse is registered a message will be sent to whoever calls the user of this app provided that the caller is not in the favorite list, controlling SMS charges the message which will be sent to the caller will only be one. Further calling action will produce no result.



My Assistant

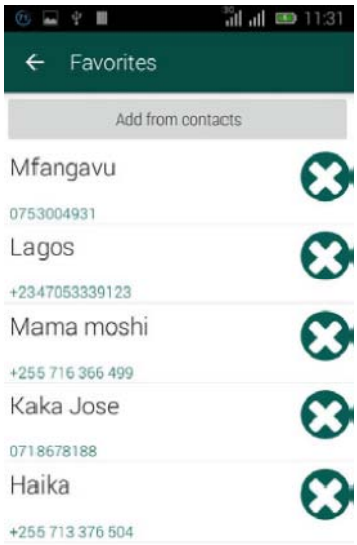
Assistant is a person who is in the favorite list, but unlike other favorites an assistant will be responsible for attending phone calls on your behalf, the app is designed to let the caller be able to call app user's assistant, this was to ensure that the service which was supposed to be dealt by a phone user will be provided by his or her assistant. An assistant value can also be null provided that the user has no list of favorites.



Favorites

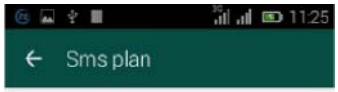
These are group of individual whose information you would not want to be sent to anyone but you and only you, at any time these people will have chance to reach you through your mobile phone. Knowing that these people can cause disturbance too the app is designed to only vibrate to these group of people, but also the user is enabled to be able to remove or change favorites.

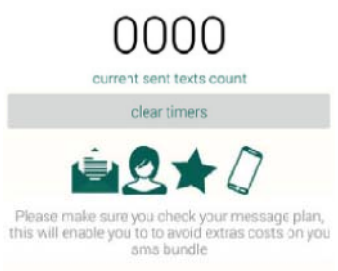
The favorite's value can also be null, but the effect is that the user will have no assistant to attend his or her phone calls, but a user can set only one favorite who can also be given privileges of an assistant.



SMS plan

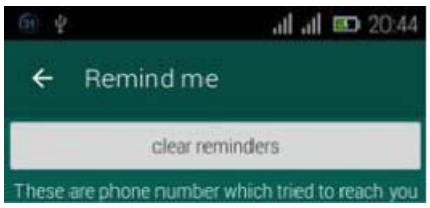
Considering that the software will require sending of SMS notifications to the caller of mike assistant app, we design the software by means of controlling number of notification to be sent to the callers. The SMS plan screen display four digit number for showing total number of responses which can be sent is only a 1000 value, also it was a means of alerting the user of the software to check his plan and thus reducing chance of incurring more costs which the user can't be able to manage.





My reminders

My reminder section to this software will display non favorite's numbers which tried to reach you but you weren't able to attend their calls, this will then help other software component to function properly. It's called reminder screen because it also enable the user to know who called them and be able to get in touch with their assistant to know what they were in need of .



Technical Details

Large part of the software was written in java programming language using core Java 7 Standard Edition libraries and JDBC(Java Database Connectivity).

Software database was written using SQL (Structured Query Language).

In relation to SQL the following API's were used:-

-rs2xml API

-Jdbc API

The software Also used Kannel Sms Gateway which was linked with The software using kannel API from Java Codegeeks.

Software Usage and Purpose of Creation

Software requirements

The software can run on any platform provided that there is communication with the server where Kannel Sms Gateway is installed and there is modem which supports all AT commands on the server.

The software can also run locally on linux machine which has Kannel Sms gateWay installed, LAMP server and modem which support all AT commands (which was the way is used in developing and testing my software).

Note

The software cannot Run in Mac Os locally. If there are no connection with linux server where modem is installed.

Software also require installation of java 7 to run. Otherwise the software may not be productive at all (this was tested).

Software used the following API's

1. Kannel API
2. rs2xml API
3. Jdbc API

Other Api's are part of java Standard Edition Core Library.

The software was developed using developer original algorithms.

The developing environment was Linux (Ubuntu 13.04)

-IDE used was Netbeans.

We used intel Atom notebook computer with only 1Gb RAM thus most part of programming were done using textEditor (Gedit textEditor).

Software Graphics and this document creation was done on Window 7

Machine by using by :-

-Adobe illustrator Cs6 (document and artworks) and -Photoshop cs6 (some of software Graphics)

Conclusion

The application was created to promote Tanzania in the field of Technology. This software is very easy to use and each and every human need is considered wherever it is necessary. With this tool the government (at city level) is able to answer to all the citizens or specifically basing on occupation and residence within city. I developed this software after the complains of our people in my country that their information are completely ignored because of the unavailability of Government employees. I also realized also some big organization in my country needs to have a nice and easy way of answering to calls to all the people rich or poor without any partiality.

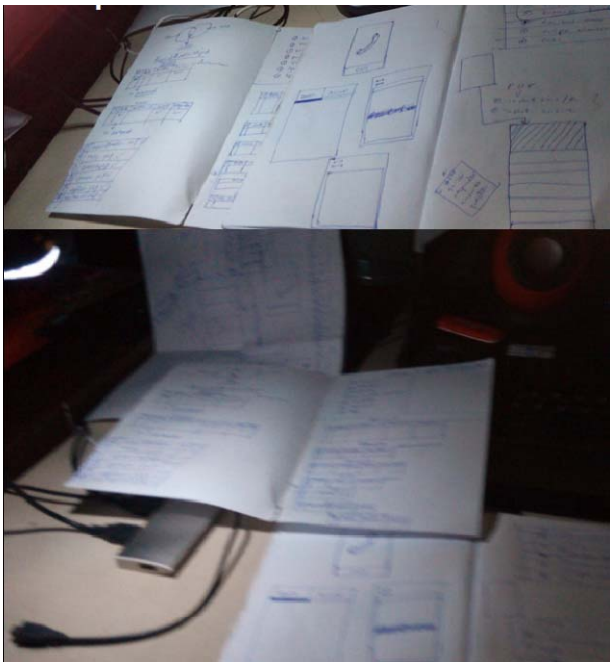
So the software development focused on creation of software which is more flexible. (software which can meet needs of organization from city with little or no modification at all). I believe Information on various topics can increase people awareness, in this i have also included tips of day which could be sent to different people on a day. I coded this software

using best programming practices and efforts were made to make it unlimited in aspects relating to information.

Developer photos



Development photos



RFID Integrated Teacher Monitoring

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Introduction

Radio Frequency Identification (RFID) is a generic term for non-contacting technologies that use radio waves to automatically identify people or objects. There are several methods of identifying human or object, but the most common, in today's world, is to store a unique serial number that identifies a person or object on a microchip that is attached to an antenna. The combined antenna and microchip are called an "RFID transponder" or "RFID tag" and work in combination with an "RFID reader" (sometimes called an "RFID interrogator" because it queries the tag in the cause of retrieving the stored number or information). An RFID system consists of a reader and one or more tags. The reader's antenna is used to transmit radio frequency (RF) energy. Depending on the tag type, the energy is "harvested" by the tag's antenna and used to power up the internal circuitry of the tag. The tag will then modulate the electromagnetic waves generated by the reader in order to transmit its data back to the reader. The reader receives the modulated waves and converts them into digital data.

The RFID transponder are classified as either active, if it requires power, or pass if no power is required. The range and capability is improved when it is active but it tends to make the transponder expensive. Sometimes it cost is ten times that of a passive transponder. The passive transponders get it needed power from the radio energy emitted by the reader during the course of reading/querying. The transponders and readers come in various frequency ranges:

Low frequency: 125 – 134KHz
High frequency: 13.36MHz
Ultra high frequency: 902-928MHz
Micro wave frequency: 2.4GHz

Related work

Bolivar Torves, Qing Pang, Gordon W. Skelton, Scott Bridge (2013) described the research that integrated RFID and WSN technologies to design a real time access control application. Their purpose was to integrate RFID reader to a wireless sensor network to identify individuals' carrying RFID tags. The work of sending commands to the RFID to make it read a tag and send it back to the computer was accomplished by python code developed which also controls the data signal. One of the hardware employed in their work is SNAP SN171 Proto board. The RFID node of the board sends and receives signals from the RFID node each time it is told to do so by the application software. The node that starts the procedure of continuously detecting a tag near the RFID node is the polling node. This node sends a Remote Procedure call (RPC).

Md. Kafil Uddin, Mahbubur Rahman, Go Kim and BongHee Hong (2010) designed and implemented an efficient RFID sensor middleware architecture for sensor tag that incorporates extended APIs to provide compatibility and global interoperability of the system. Their purpose is to design and implement RFID sensor middleware compliant with EPC Architecture framework. The architecture had the application layer as the top layer and provided four APIs. The 4th API is the sending alarm notification which is an API that sends synchronous reporting of sensor tag data for user query and alarm notification to the users synchronously of any alarm event.

Noureddine Chikouche, Foudil Cherif &Mohamed Bennohammed (2012) proposed an authentication protocol based on the combination between RFID system and Biometric system. The purpose of the work is to verify secrecy, authentication of the tag and

authentication of the reader by AVISPA and SPAN tools. In their work, they submitted that communication amongst the server and the reader and communication between the server and the sensor is secure. On the contrary, communication between the tag and the reader is not secured and it is based on radio frequency wave which adversaries can obscure, block, modify and inject messages from any communication between a reader and a tag.

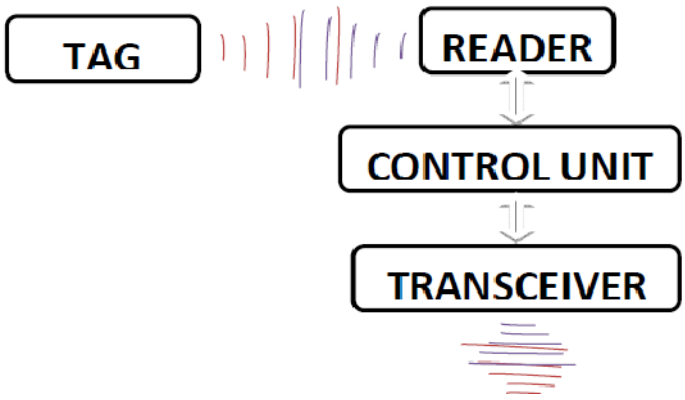
Steffan Elmstrom Holst Jensen & Rune Hylsberg Jacobsen (Retrieved 2015) wrote on more advanced active tags. Sensor tags may run additional software and can be equipped with communication software such as IP protocol stack. Another interesting use case can be applied to sensor tags. When these sensor tags connect to network sensor data can be retrieved from the tag.

Rashid Ahmed & John N Avarissiotis (Retrieved 2015) collected data from special badges containing RFID tags and identified these tags to interact with NTUA information system to detect the employees that are entering and leaving the college.. The purpose is to identify employees using RFID in IE-NTUA. RFIDs can read information on multiple tags simultaneously without necessarily requiring losses and without the need for a particular orientation.

Methodology

In the proposed work, passive transponders will be used. When a passive transponder gets into the range of a reader, utilizing the released energy of the reader, it sends it identification to the reader. This process is in accordance with the Faraday's law of electromagnetic induction.The current flowing through the interrogator (reader) coil produces a magnetic field that links the coil of the transponder and causes current to flow in it. As the signal continues to flow, there is variation in the load on the antenna as a result of the modulation which is in accordance with the transmitted data/information.

The system will comprise of passive UHF tag (transponder card), a reader, microcontroller control unit and a wireless transceiver.



Tag

The tag for the monitoring system is a small card with a passive RFID chip implanted in them. This card carries the unique identification number of the holding teacher and shall be carried to the lass at all time by the teacher otherwise; the teachers' activities of the day will not be captured. Since the card requires no power for operation and no maintenance by the holder, there is no technical input required from the holding teacher. All the teacher needs to do is to carry the card in his pocket or hand bag. The card when it comes into any class where there is a reader, it communicates with the reader in that class wirelessly without the knowing of the holding teacher and very fast. The communication start and finish in less than one second of entering the vicinity of the reader. The card is made of plastic like the regular ATM card.



RFID tag

Reader

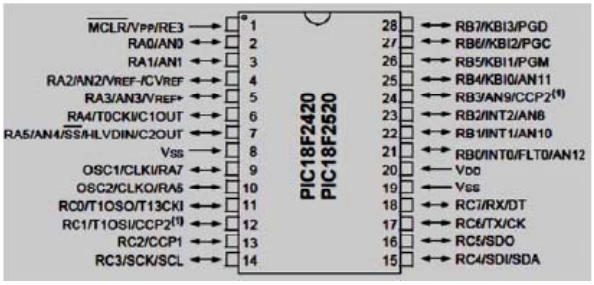
The reader retrieves the information stored in the tag via electromagnetic energy emission. When the tag senses this emission, it sends it identification to the reader. The reader under the control of the control unit, forward the received information to the embedded microcontroller. In a passive RFID system, it is the reader that initiates the reading process. When the reader is down, the section covered by that reader is cut off from the system. The reader coverage is expected to cover the entire teacher space of the classroom. This is to ensure continues monitoring of the teacher through intermittent querying of the teacher's presence. This is done to capture the time the teacher leaves the class.



RFID Reader module

Control unit

The control unit controls the reading operations and data transmission and reception process. The heart of the control unit is PIC18F24200, a very powerful microcontroller with 16K word program memory, 768 SRAM (static random access memory), 256 EEPROM (electrically erasable programmable read only memory), 25 i/o pins, SPI, I^2C, and EUSART communication modules suitable for communicating with a wireless transceiver like the UM92. The microcontroller is fast and can be clocked internally at 8MHz or externally up to 40MHz. the control information is to written in C language and compiled and loaded into the microcontroller with a PIC microcontroller programmer.



PIC18F2420

The microcontroller prompts the reader to send the id of the card in it vicinity every minute via the EUART (enhanced universal asynchronous receive transmit) port. When this information is received, the microcontroller sends it to the database station wirelessly through the wireless transceiver connected to it EUART port.

Transceiver

The transceiver is a wireless communication module that can receive and transmit at the same time. A typical module of this nature is the UM96.These small wireless modules use a seamless serial interface (UART) - whatever enters the TX pin at 9600bps shows up on the other unit's RX (database transceiver's) pin. All buffering and error detection is handled internally. And the best part - with 10mW output, it reaches over 500 meters (half a kilometer range radius) sufficient to cover a normal school.

This unit is connected to the control unit's microcontroller TX and RX pins for incredibly simple serial cable replacement!



Specifications:

- Operating Voltage: 3.3V-5.5V
- 9600bps over 500m
- Modulation type: GFSK
- 8 Channels jumper selectable
- Low power : 30mA RX, 40mA TX, 20uA Sleep
- Small footprint size: 26 x 47 mm

The receiving transceiver is identified with the accompanying address of the receiver. Data can be transmitted in byte or as set of bytes. Each of the um96 to be will be identified with a classroom number programmed into the control microcontroller of the class.

Database transceiver

The database transceiver is the transceiver on the database side of the system for wireless communication. It is also UM96 transceiver. It wireless links the reader side TX with the database side RX and vice versa. The data base side is the data entry and processing side of

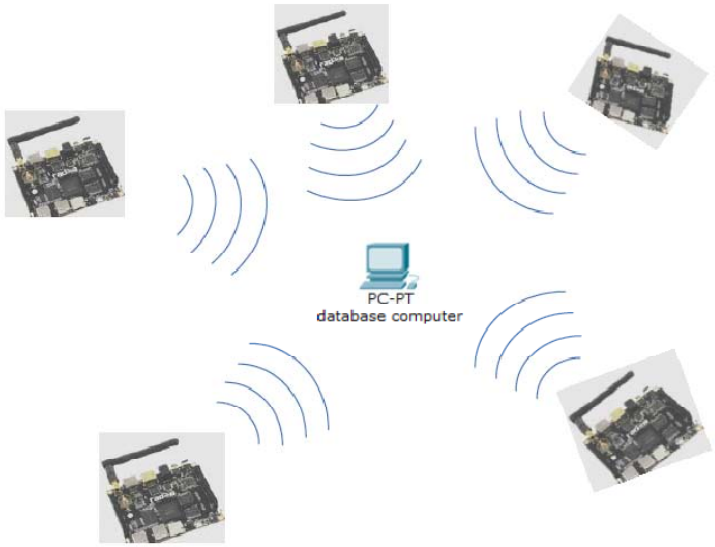
the system. This module communicates the received data to the computer via RS232 communication port and protocol. It has its own unique address on the system network.

Database computer

A program in visual basic, C# or JAVA, will be written to collect this information and tabulate them in a defined order. With this, the teachers can be identified; the time he/she enters and leaves a class can be documented for a period. This documentation will be marched with the class time table. With this, when another teacher gets into a class that he or she has no business with at any time, the information sent to the data base as at that time will be ignored.

Networking

To cover the entire class room of the school with this technology, the RFID reader, controller and transceiver unit (classroom unit) shall be duplicated. Each of this unit shall have their unique identification number for differentiating them. The database unit is just one and all classroom units send their information to it.



Class room unit and database network

References

[1.] Bolivar Torves, Qing Pang, Gordon W. Skelton, Scott Bridge (2013): "Integration of an RFID reader to a wireless sensor network and its use to identify an individual carrying tags" In International Journal of Ad hoc sensor & Ubiquitous computing Vol. 1, No.4

[2.] Md. Kafil Uddin, Mahbubur Rahman, Go Kim and BongHee Hong (2010): A dual Data Processing system using sensor Integrated RFID Middleware. Proceedings of the 2nd International conference on Emerging Databases.

[3.] Noureddine Chikouche, Foudil Cherif & Mohamed Bennohammed (2012): "An Authentication Protocol Based on combined RFID-Biometric system" In International journal of Advanced computer science and Application. Vol.3, No.4

[4.] Rashid Ahmed & John N Avarissiotis (Retrieved 2015): Identification of Employees Using RFID in IE-NTUA

[5.] Steffan Elmstrom Holst Jensen & Rune Hylsberg Jacobsen (Accessed 2015): Chapter 6: Integrating RFID with IP Host Identities" http://dx.doi.org/10.5772/53525

Power Consumption Modeling of Base Station as per Traffic Generated

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This Paper highlights the development of power consumption model and addresses the energy efficiency improvement.
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Abstract

Base Station is the main contributor of energy consumption in cellular mobile communication. The traffic of base station varies over time and space. Therefore, it is important to quantify the influence of traffic generated on the power consumption. This paper investigates changes in the power consumption of base stations according to their respective traffic and develops a model for the power consumption as per traffic generated aiming to highlight the power consumption model development and address the power saving capabilities. The primary data in terms of power consumption and traffic load have been measured hourly on fully loaded 10 base stations for 10 days. The regression analysis shows the existence of a direct relationship between power consumption and traffic generated. A linear equation is developed is $Y = 1.713 \times X + 1.274$, where Y is power consumption and X is traffic generated, which shows that the power consumption of base stations linearly depends on the traffic generated. One noticeable point is that when the traffic is high, the developed linear equation indicates that the data fits well in the model but on the other hand, when the traffic is low, the developed linear equation explains less variability of the response around its mean. This paper also gives an overview of energy efficiency improvement possibility in base station.

Keywords *: Base Station, Efficiency, Modeling, Power Consumption, Traffic*

Power consumption modeling of base station as per traffic generated

Telecommunication is playing a significant role in the daily life of people in today's globalizing context. The tele density has surged to 100 % this year in Nepal (Nepal Telecommunication Authority, 2015). Nepal had an annual GDP per capita of USD 696.9 in 2014 and every 10 % increase in broadband penetration provides a 1.38% increase in GDP for low and middle-income countries (Broadband Commission, 2010). The growing interest in new and reliable services in mobile communications has resulted in an increased number of installed base stations worldwide. In addition, the traditional concept of base station deployment assumes continuous operation in order to guarantee the quality of service anywhere and anytime. Both of these reasons have synergistically contributed during the last decade to the significant growth of the total energy consumed by base stations of cellular network operators (Lorincz, Garma & Petrovic, 2012).

Nepal is severely facing energy crisis with an average 12 hours of load shedding per day so the challenge is to provide reliable and cost effective power solution. For this, a power consumption model is developed as per traffic generated. It is well known that the main source of energy consumption in cellular mobile networks is the base stations, with a share in total network consumption greater than 50 % (Deruyck, Vereeckeh, Joseph & Martens,2010). The main cause for the green house emission in the world can be attributed to radio networks in mobile communications. It is however important to determine the consumption of the whole wireless access network and thus to model the power consumption of each part of this network. Within these networks, 10 % of the energy is consumed by the user terminals, while 90 % is caused by the base stations. These numbers indicated that the power consumption of wireless access networks is going to become an important issue in the coming years (Deruyk, Joseph & Martens, 2011).

In a world of exploding, wireless communications, improving the power efficiency of radio networks is an important research topic (Fehske, Fettweis, Malodin & Biczok, 2011). To evaluate the energy efficiency of today's mobile communication systems and to identify improvement areas for next generations system, a high level energy efficiency evaluation (E3F) has been developed within the Energy Aware Radio and neTworking technologies (EARTH) project (EARTH project, 2007-2013). This framework covers the complete system, including network and radios (Gunther et al ., 2011). It enables a quantitative evaluation in terms of efficiency under different traffic and load scenarios.

A power consumption model is developed based on the power consumption and the traffic generated by base stations. Energy efficiency at various loads viz, low traffic and high traffic are compared. The power consumption of base stations consists of two parts. The first part describes the static power consumption, a power figure that consumed already in an empty base stations and dynamic power consumption which changes with traffic load. Depending on the load situation, a dynamic power consumption part adds to the static. In this research, only dynamic power consumption with respect to traffic load has been considered. A power model is derived for typical base stations that is installed here in Kathmandu.

Only a few works have been done regarding the power consumption modelling of base stations. Reducing the energy consumption of base station, which is the main energy consumer, in the cellular networks has recently become an important research topic (Lorincz et al., 2012). The most remarkable contribution to this topic can be found where power consumption modeling of base stations has developed (Deruyk, Joseph & Martens, 2011). But these contributions have not considered the real traffic load. To the knowledge of the authors, such study comprising of power consumption and traffic generated with real time data has not been yet carried out in Nepal.

Methods

A power consumption model as per traffic generation of a base station is proposed. An important parameter to investigate is the energy efficiency of the base station. The energy efficiency here is defined as the power consumption needed to cover a certain area (in W/m^2). The power consumption PC_{area} per covered area is then defined as (Deruyck, Joseph & Martens, 2012):

$$\text{PCarea} = \frac{P_{el}}{\pi R^2}$$

with P_{el} the power consumption of the base station and R the range of the base station. The lower the PC_{area}, the more energy-efficient the base station is.

A base station is defined as the equipment needed to communicate with the mobile stations and with the backhaul network. The area covered by a base station is called as cell that is further divided into a number of sectors. Each sector is covered by a sector antenna, which is a directional antenna with a sector-shaped radiation pattern (Son, Kim, Hi & Krishanmachari, 2011).

To determine the load, measurements were done for an actual base station in the urban area of Kathmandu, Nepal. The power consumption of the 10 base stations for 10 days including weekend days were measured. The group of load-independent components i.e., the rectifier, the air conditioning and the microwave link were not included in these measurements. For the equipment considered, the voltage is constant (i.e. approximately 54 V) and thus the current was measured. The power consumption P(t) at a certain time t is then determined as follows (in Watt):

$$P(t) = V.I(t)$$

with V the voltage (in Volt) and I the current at time t (in ampere).

The primary data of 10 base stations was collected for 10 days. The collected data includes current drawn and traffic load of respective base stations. The voltage of equipment is 54 V (constant) which is multiplied by current to get the power consumption. The average power consumption for each hour during the measurement period was determined, which gives the vector power. The normalized power consumption per hour was also obtained. Similarly, the traffic load of respective base stations was measured on hourly basis. Thus the total collected sample values for both power consumption and traffic load was 240 (24*10) per site. The current was measured with an AC/DC current clamp. The value of the current was saved every second, which resulted in 8,64,000 samples for the measurement period of 10 days. For the week days, it was noticed that the power consumption at night is lower than during the day, because during the day more people are active than at night. For the weekend days, this difference in power consumption is smaller than for weekdays. The data collected for power consumption per hour for weekdays and for the weekend was also calculated. The measured equipment consumes between 1016 W and 1087 W. Traffic is mostly high during the weekdays (Sunday to Thursday) and low during the weekend days (Friday and Saturday).

After collecting the primary data, regression analysis was done using Microsoft Excel. Regression analysis is a statistical tool for the investigation of relationships between variables. Here, power consumption and traffic load are the two variables. The casual effect of traffic load on power consumption of base station will be analyzed. The relationship between power consumption and traffic load will be identified.

Results and discussion

The relationship between the power consumption of base stations with respect to the traffic load is obtained. The data of power consumption of 10 different base stations and their respective traffic load were collected for 10 days on hourly basis. There were total 2400 sample values for both power consumption and traffic load.

It was found that the traffic load is high during morning and evening from 08:00 - 11:00 hrs and 18:00 - 20:00 hrs, which is shown in figure 1. The maximum traffic load is 143.6 erlang and minimum traffic is 3.3 erlang.

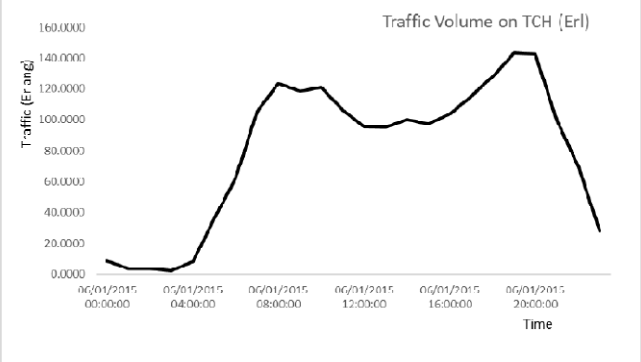

Figure 1: Traffic Pattern of base station

It was found that the power consumption of base station varies from 1.25 KWh to 1.63 KWh. The range of power consumption did not vary so much as the traffic load varied largely which is shown in figure 2. The highest power consumption was recorded between 08:00 to 11:00 hrs for each day whereas the lowest power consumption was recorded from 00:00 to 6:00 hrs.

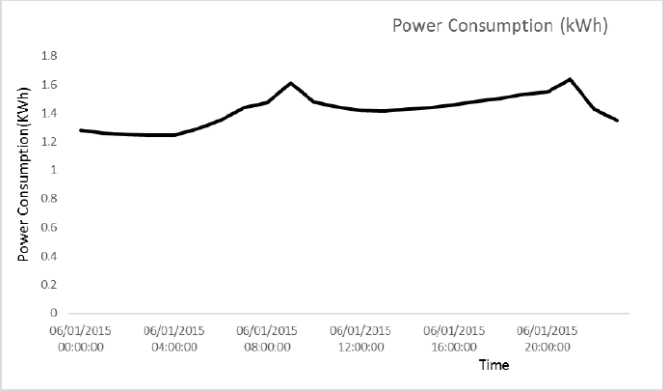

Figure 2: Power Consumption of Base Station

It was also found that the power consumption of each base station differed in weekdays and weekends. The traffic load of each base stations was seen high during 10:00 to 14:00 hrs. and lowest between 14:00 to 19:00 hrs.

The power consumption pattern is a direct consequence of a daily traffic pattern variation. It was observed that the increase in the traffic results in an increase in the power consumption of base station. A comparison between traffic load and power consumption is presented in figure 3. There is a direct correlation between the power consumption and respective traffic load. Figure 3 shows the comparison of power consumption and traffic load for 10 days, which clearly shows the correlation between power consumption and traffic load.

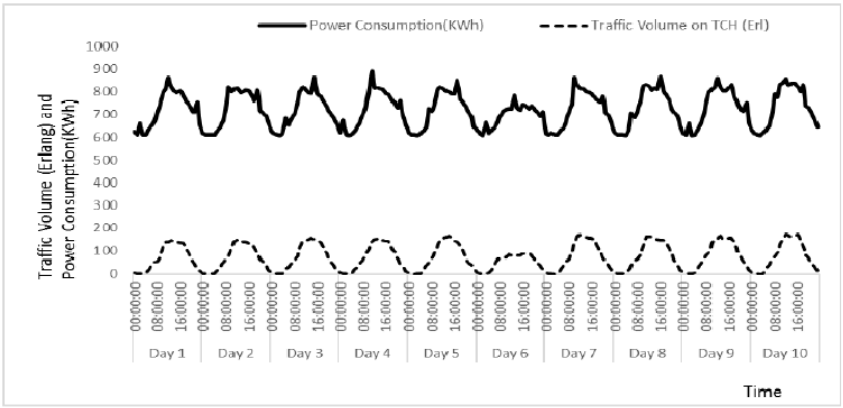

Figure 3: Power Consumption and Traffic load of Base Stations for 10 days.

The traffic load has maximum value of 230.137 Erlang and corresponding power consumption is 1.635 KWh during 10:00 to 11:00 hrs. Figure 4 shows the power consumption and traffic load generation for a single day. When the traffic load is high, the correlation between power consumption and respective traffic load is also high.

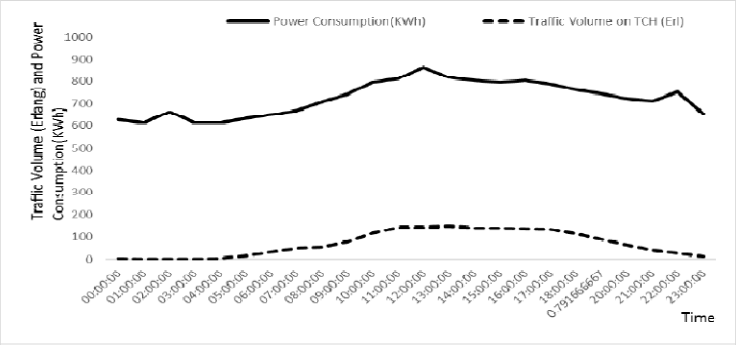

Figure 4: Traffic Volume and Power Consumption of a day of one Base Station.

To test the statistical model we have to check the value of R squared. The coefficient of determiniation, R Squared is the number that indicates how well data fit a statistical model. It is also known as the coefficient of determinaition. 0% indicates that the model explains none of the variability of the response around its mean. In this study, the value of R square varies from 0.765 to 0.949 which indicates that our model explains good variability of the response data around its mean. Adjusted R Squared lets the percentage of variation expalined only by the independent variables that actaully affect the dependent variable. Here Adjusted R square varied from .7648 to 0.9489.

Table 1: R squared and Adjusted R squared value of different Base stations

Base stations	R Squared	Adjusted R Squared
Dhapasi	0.7658	0.7648
Kalikasthan	0.7870	.7861
Maharajgunj	0.8042	0.8034
New Baneshwor	.8142	0.8134
Panipokhari	0.7931	.7922
Sinamangal	0.8167	0.8159
Sundhara	0.8890	0.8885
TTC	0.8000	0.7999
Jawalakhel	0.8945	0.8940
Pulchowk	0.9491	0.9489

Based on the measured traffic load and the power consumption obtained for each base station , the goal is to develop a linear power consumption model as per traffic generated. The developed model must express power consumpiton of each base station as a function of currrent traffic load. In order to model the interdependence between the power consumption of each base station rack and corresponding traffic load , we used the following equation (Josip Lorincz, 2012)

$$y = \beta_1 f_{1(x)} + \ldots\ldots\ldots \beta_p f_{p(x)} + \square \qquad (1)$$

According to Equation (1), response y is modelled as a linear combination of function of independent variable x and a random error □. In this expression $f_{1(x)}$ (j=1,…,p) are the terms for the model, while β_1 (j=1,….,p) represents the coefficients. It is assumed that the model has upto p different terms and corresponding coefficients. Uncontrolled factors and experimental erros are modelled in above equation by □ and assumed to be uncorrelated and distributed with zero mean and constant variance.

In this linear model, terms are $f_{1(x)} = 1$ and $f_{2(x)} = x$. For n independent observations (x1, y1),….., (xn,yn), the linear regression model becomes :

$$y = X\beta + \square \qquad (2)$$

Let the telecommunication traffic Tr [Erl] be independent variable x, while the meausred power P[W] is response y. Then the coefficients of the regression line are : β_1[W] which represents the intercept and β_1[W/Erl] which represents the slope of line. Calculations were performed by means of a function regression which is a part of Excel. The obtained results are shown in the table 2.

Table 2: Slope and Intercept of different Base stations.

Base stations	Intercept (a)	X Variable (b)
Dhapasi	636.1630	0.8547
Kalikasthan	631.1256	0.7466
Maharajgunj	629.1695	1.9822
New Baneshwor	584.6320	1.0840
Panipokhari	685.4675	0.8905
Sinamangal	656.9946	5.10743
Sundhara	697.3975	2.7711
TTC	602.7391	1.3878
Jawalakhel	626.3360	1.2840
Pulchowk	621.7678	1.0227
Weighted Average	637.1793	1.7131
Pure Weighted Average	1.2743	1.7131

The final developed equation of the above values is

$$Y= 1.274 + 1.713*x$$

where Y is the power consumption of base stations and x is the traffic generated .

The developed linear models have been plotted together with the measured results and linear regression lines having 95 % confidence interval. The linear dependence of the power consumption on the traffic load was observed from above figures. An increase in the traffic load results in a linear increase of the base station power consumption.

When the traffic load is very low, the proposed linear models ensure some fixed amount of power consumption. Following table shows that the dependent variable is very small and can be neglected . The intercept value only ensures power cosnumption. So during no traffic also certain amount of power cosumption (intercept value) is used by base stations. The R squared value is minimum which ensures the result.

The linear equation at low traffic is $Y = 0.00057*x + 1.22677$

Table 3: Equation and R square Value of sites

Site	R Square	Equation
Dhapasi	0.3123	Y= 0.0004*x + 1.2332
Kalikasthan	0.6174	Y= 0.0001*x + 1.2216
Maharajgunj	0.0158	Y= 0.0003*x + 1.2478
New Baneshwor	0.0033	Y= 0.0012*x + 1.1100
Panipokhari	0.8522	Y= 0.0003*x + 1.3276
Sinamangal	0.5259	Y= 0.0015*x + 1.200
Sundhara	0.4554	Y= 0.0002*x + 1.3222
TTC	0.8594	Y= 0.0003*x + 1.1917
Jawalakhel	0.0521	Y= 0.0012*x + 1.1928
Pulchowk	0.7930	Y= 0.0002*x + 1.2208

But when traffic load is low during off hours i.e. 2:00 am to 6:00 am, the correlation between power consumption and traffic load is low as shown in figure 5.

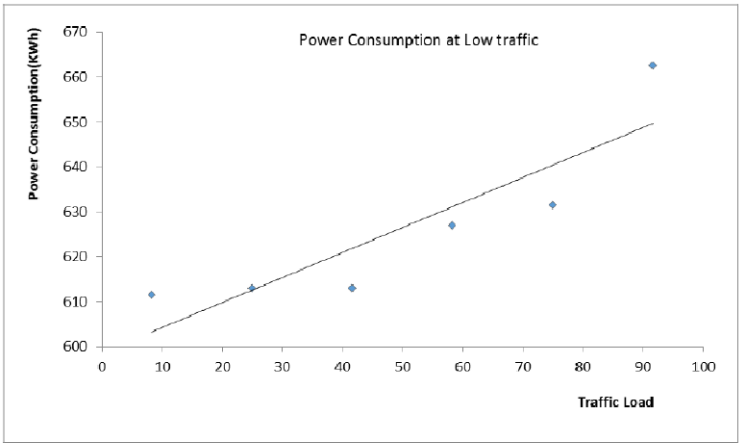

Figure 5: Normal Probability Plot at low traffic

Each linear model corresponds to the specific base station technology and base station of different technologies, manufacturers, production years of configurations might have different linear models (Lorincz et al., 2012).

Conclusion and recommendations

The main purpose of this research is to develop a model for the power consumption of base stations as per traffic generated. The impact of traffic on the power consumption of base stations is monitored. The traffic and power consumption data of 10 base stations were collected for 10 days for 24 hours on hourly basis with total sample values of 2400. For each base station, the linear model has been developed. Each linear model has R squared value range from 0.765 to 0.949 and adjusted R squared value range from 0.764 to 0.948, which validates the linear model. Similarly, the power consumption of base stations varies in accordance with the traffic load. This shows that there is a direct correlation between the base stations power consumption and the traffic load pattern. The proposed model with a significant percentage of confidence signifies the results obtained.

This implies that the linear power consumption model can be accepted as a model for precise expression of the interdependence between base stations power consumption and traffic load. During maximum traffic load, the developed linear model fits well but during minimum traffic, the linear model does not fit well as the R squared value ranges from 0.0033 to 0.3123. At no traffic also, base stations still consume power which is given by intercept value. This intercept value will be nullified when the base station is in standby mode. Based on this research findings, further research on cell zooming considering the impact of traffic, spectrum, handover and quality of services has been recommended.

References

[1.] Albrecht fehske, G. F. (2011). The Global footprint of mobile communication: The ecological and economic perspective. *Communications Magazine, IEEE, 49*(8), 55-62.

[2.] (2010). *Broadband Commission for Digital Platform.* Retrieved from www.broadbandcommission.org: www.broadbandcommission.org

[3.] (2007-2013). *EARTH project .* European community's seventh framework programme.

[4.] Gunther Aeur, V. G. (2011, October). How Much Energy is Needed to Run a Wireless network? *IEEE Wireless Communications Magazine, special issue on Technologies for Green Radio Communication Networks, 18*.

[5.] Josip Lorincz, T. G. (March 2012). Measurements and Modelling of Base Station Power Consumption under Real Traffic Loads. *Sensors*.

[6.] Kyuho Son, H. K. (2011). *Towards Energy - Efficient Operation of Base stations in Cellular Wireless Networks.* Green Communciation.

[7.] M. Deruyck, E. T. (2011, March). Modelling and optimization of pwoer consumption in wireless access networks. *Elsevier Computer Communication*. doi:10:1016
[8.] Margot Deruyck, W. J. (2011). Power Consumption Model for Macrocell and Microcell Base stations. *EUROPEAN TRANSACTIONS ON TELECOMMUNICATIONS*, 1-14.
[9.] Margot deruyck, W. J. (2012). Power Consumption model for macrocell and microcell base stations. *Emerging Telecommunications Technologies*.
[10.] Margot Deruyck, W. V. (2010). Power Consumption in Wireless Access Networks. *In Proceedings of European Wireless Conference*, 924-931.
[11.] Margot Deruyk, E. T. (2011). Modelling the Energy Efficiency of Microcell Base stations. *The First International Conference on Smart Grids, Green Communication and IT Energy-aware Technologies*.
[12.] Nepal Telecommunication Authority. (2015). *MIS Report.* Kathmandu: NTA. Retrieved from http://nta.gov.np/en/mis-reports-en
[13.] Oh, E., Krishnamachari, B., Liu, X., & Niu, Z. (2011). Toward dynamic energy efficient operation of Cellular network infrastructure. *IEEE, 49*, 56-61.
[14.] Oliver Arnold, F. T. (2010). Power consumption Modeling of Different Base Station Types in Heterogenous Cellular Networks. *Future Network and Mobile Summit 2010 Conference*.
[15.] Z., N., Wu.Y.j Gong, J., & Yang, Z. (2010). Cell zooming for a cost- efficient green celluar networks. *IEEE Communciation, 48*, 74-79.

Research, Technology and Innovation: The Bedrock for Global Development

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Synopsis

The above three concepts are a product of scientific ideas. Global development can only be achieved with solid reliance on research, technology and innovation. The three concepts represents the only way for developing the world in order to foster economic, education, environmental, medical and societal development at large (Cramer and Zegveld, 1991). Development in science and technology are fundamentally altering the way people live, connect, communicate and transact, with profound effects on economic development (Lee-Roy, 2012). According to V. Samuel cited in Jubel (2012), 'Science is the key which unlocks for humankind the store houses of nature'. Obsessed by the quest to improve his life; to add values and make a paradigm shift in nature, a global change has smiled to the prevailing efforts of man. He has not just learnt how to cut stones in to blocks but how to use them in a better published form to build edifices. This is development!

A sweep in to the history of the computer system marshals out litanies of stages that the computing system had undergone before it came to the taste of the modern man. Right from the times of the ancient Babylon which is now known as 'Iraq**',** the so-called abacus machine was invented, one of the earliest devices used by the primitive man to improve his state of living, calculation. He was not satisfied by this innovation; he enthusiastically delved more in to research and found out that addition and subtraction could be better done using a machine which was named after the inventor, 'Napier bone' by John Napier, precisely in 1614. This technological advancement and product of research work was spiced by the innovation of the inquisitive man.

Hovering round your mind now is how and if these changes have helped in global development. I crave your indulgence to exercise patience for a brief prelude and chronicle of the modern technology which could serve as a frame work to illustrate the above topic under discourse. So, in 1623, a German professor of the University of Tubingen in Germany, Wilhelm Schikeard constructed the first mechanical calculator which worked only with six digits. Advancement in technological innovation is here again! Yet, man was not satisfied with this as his curiosity still dragged him to the idea of research using his curious mind. It was in 1642 that a French philosopher called Blaise Paschal invented a machine that was named after him, the 'Paschal Calculator'. He actually invented it to help his father who was a tax collector. Here, we could see how innovations served human problems.

History yawned happily on us when the great British mathematician, Charles Babbage in the 19th century (1820 and 1821) worked out the principles of the modern digital computer. This great intellectual introduced an idea that helped to solve complicated mathematical problems. Historians believe that Babbage and his group were the first people to invent the modern digital computer.

With the advancement of Information and Communication Technology (ICT), this is of course the conception of an innovation, pieces of material like journals, articles, updates etc could serve all and sundry as well as students well when they hunger for information. On the internet we find unadulterated definition of scientific work as pieces of vital information compete for web space for the person who makes a research work.

The nucleus of this research work is technology, while the vital force behind its advancement is innovation, which is man's usage of his idea! As I set my fingers scrolling up and down the screen of my personal computer (PC) now is as a result of technology, the

computer system; whereas the installed information that I source for is a result of an intellectually articulated innovative idea as well as a confirmed research work.

To then ask, ponder or wonder how these enormous and numerous scientific works have become the bedrock of global development is like contemplating whether a monkey eats banana. The result of this is obvious! Today, we talk and experience globalization. Is it not development, stemming up from research, technology and human innovation?

One of the phenomena identified as the major dynamics of change and consequent global development in the 21st century is globalization. The term 'globalization' precisely describes the process of increasing interconnection between societies such that events in one part of the world have effects on peoples and societies far away. Thus, in an angular perspective, we can say that a globalized world is a developed world. It is one in which political, economical, social, educational and cultural events become more and more interconnected, and also one in which the impacts of these events in one society affects extensively the lives of people in other societies.

We won't be outside the track (this topic) to understand into to the concept of globalization, as it would form a tapestry on which the colored thread of this write-up could be woven. Therefore, what is globalization? In this context, we shall approach the definition using two (among five) of Fongwan Severin's delineation.

According to Fongwan (2013), globalization could be considered as universalization. In this link, the word 'global' is used in the sense of being 'worldwide' and globalization is seen as the process of spreading various objects and experiences to people at all corners of the earth. A classic example of this would be the spread of computing, television, etc.

In the second delineation, globalization could be equated with internalization. In this context, globalization is viewed simply as an adjective to describe cross-border relations between countries. It describes growth in international exchange and interdependence. Therefore, with growing flows of trade and capital investment, development is defined.

Prognosis

In rummaging in to the treatment of this topic, I could psych opposing minds: that the aforementioned concepts can never be the bed rock of global development nor the stepping stone to achieving that; they are rather impediments to global development and reformation for reasons which we shall discuss subsequently. More so, if I don't stripe naked this judgment in a thesis and consequently counteract the view in an antithesis and synthesize the two in a synthesis, my write-up here would be epileptic and half baked. Therefore, I shall begin by stating some of the concerns of those who disavow the possibility of advancement and a global development through research, technology and innovations by stating their thesis. Then I shall go on to project the counter views in an antithesis while I shall make some efforts to synthesize the two views in a synthesis as well as make concise definitions and conceptions of the subject matter herein, thereby conclude.

Thesis

Over the course of human history, people have developed many interconnected and validated ideas about our world in terms of research, technology and innovation. Many people express the opinion that the tripartite (Research, Technology and Innovation) concepts and global development are discretely parallel. Most of their assumptions take root from socio-cultural factors to religious and ethical beliefs. This type of thinkers are those that cast the laws and beliefs of their fore fathers peculiar in the days of yore over the present age; they place the past to the present being less mindful of the great words of Heraclitus, the father of change who said that everything changes except change itself which does not change. Heraclitus opined that the world is in a perpetual state of flux.

So they say that the world which is changing in an exhilarating manner and a lifetime in it can only be a nightmare for many; yet what we seek daily, seems in all ramifications of our human existence is more change. Change, to them is a political jargon, a jazzy incoherence

filtered out of our collective psyche for better humane environment, better governance and juvenations of moral infrastructures towards a more purposeful existence. No matter how much we seek change, things have remained the same in the backdrop of the growing global moral confusion challenging human ethics and religion. The disobedience of Adam and Eve challenged God's authority and removed from them the sanctifying grace of God's presence.

According to them, research, technology and innovation and global development are adversaries that never go together nor have a meeting point. They are of the stand that one cannot subscribe to the tenets of one without minimizing or totally dismissing the possibility of the other, global development. For them, the three concepts have not only led to global deterioration but have built a citadel of doom for the global village. They are of the opposing view that harm has been done to the world by their inventions which is far from the so-called development that it's intended to achieve.

The invention of nuclear energy has greatly altered social life due to the technological changes. Their views ride on the cycle of changes in the social circle. They attribute underdevelopment to the threatening and terrorizing advent of technological inventions such as nuclear warhead; and postulate that countries that support them are on the speedy track to pandemonium and destruction. Some countries claim that the only way they can maintain peace is to be battle-ready; and because of this notion, the folks who oppose global development through the scientific ways on discussion assert that these nuclear bombs posses the capacity of wiping the entire human race in a twinkle of an eye and as such people now live in dread of the hour, as no one knows when a conflict may arise between nations which may call for the use of this dreadful weapons.

More so, web crimes and dupes, addicts of pornography and character assassinators, internet fraudsters and monsters; all have led the globe to a high level of retrogression in development. In their perspective, development has to do with an alliance and consensus of the ultimate good and human inventions, channeled towards addiction of values and qualities in the pre-existing *status quo* of an entity. Therefore, any change short of this, mindless of how prodigious it might be, is a severity of development. The country, Nigeria is yet to recover from the menace the extremists called *Boko Haram* sect had caused in recent time. Such trauma that runs the veins of every Nigerian citizen is *ad rem* to the postulations of this category of thinkers.

This category of thinkers look beneath the standard for which the technical equipment was made for. They propose the idea that man has used the power of his creativity and innovation to harm his fellow man. Here, scientific works such as research, technology and innovation are portrayed as tools that have led to universal technological shambles that could send any nation to her early grave. They also go a long way to inveighing their voices to their nation al anthem for hope and deliverance from the wafts of morbid scientific works. They yell for liberation from the entanglement of the ubiquitous and hazardous products of research, technology and innovation which snatch their delicious meal on the table of global peace and tranquility.

To make their point more commanding, they so easily dive in to the educational system of the modern students in a modern world full of easy livelihood. They opine that with the advancement of the technological nonsense, students can hardly write good letters, make good speeches and the aforementioned research becomes a mirage because they are too lazy to concentrate and dig deep in to history. Even when they access the internet, they waste whole lots of time visiting and traveling on different nonsensical web pages that have no relevance to life. Social media networks that ought to encourage good human relationship on air are turned to an erotic and bizarre media for the crucifixion of development.

Antithesis

Very many other great thinkers argue on the contrary proposition; that research, technology and innovation are not only bed rock for global development but catalysts and singers for cosmic reformation and advancement. In our thesis, we could see how fellows heap

arguments based on the fact that these scientific concepts are not helpful to man due to various socio-cultural nuisances they constitute. But here, we would understand that wherever there is development, there abound misuses of such developed entity. Less amazing that Barry (1972) argued that "A spiral of technical fixes occurs because of the failure to correct the fundamental flaw that technology is subject to in our society. He says that ' if technology is indeed to be blamed for our environmental crises, it might be wise to discover wherein its 'inventive genius' has failed us and to correct that flaw before entrusting our future survival to technology's faith in itself. Technologies can only become environmentally harmful and indeed problem of man only if they are not properly applied with due sensitivity to the environment". The case is severe where there is no development, as people tend to invent many criminal strategies so as to pull off the food from the rich man's table. So, whether development or not, human crime is inevitable! Albert Eistein corroborates this in his saying that there are two things that can never be changed: the infinity of the universe and the stupidity of the human person.

Research, technology and innovation have gone a long way in helping man improve the quality of his living. In the **health** sector for example, they help in the production of medicine and treatment of diseases. This means that the methods and instruments used for diagnosing diseases and promoting sanitation and hygiene have aided in the reduction of mortality rate and improvement of the conditions of living. A country which lacks such scientific and technical innovative ideas will have to depend on other countries that were sensible enough to go on research and come up with such developments for existence of her people. Such a nation cannot be referred to as caprices of other nations with necessary science and technology. With research and technological innovations, many medical conditions and procedures that required significant periods of hospitalization before now can be treated or carried out within shortest period of time thus, reducing rapidly the length of hospitalization which in turn reduces costs and risks of infection. With the product of technological innovation and research called 'telemedicine' doctors can now interact, diagnose and treat patients through interactive video and communication equipments that allows viewing and reception of diagnostic data and x-rays (Lee-Roy, 2012). With innovative technology such as assisted reproductive technology, stem cells research and bio-medical technology, infertility is gradually becoming something of the past as there are so many options from which infertile couples can choose from now such as invitro fertilization, artificial insemination, e.t.c

Electrical and electronics: In the sector of electrical and electronics, electronic gadgets which include television and computers cannot be used without the use of electricity. Electricity is needed also in industries for the generation of hydroelectric power supply. The computer which is a remarkable achievement invented, is used for economic activities, administration, education and business and has helped in the reduction of exertion of human energy as more activities can be carried out faster, effectively and more efficiently. Electronic books and electronic paper technology has made electronic media easier to read thus, replacing much paper that runs through the office printer. In addition, telecommuting and video conferencing and online study programmes has significantly reduced the need for transportation and the so many inconveniences that follows it. No wonder Jordan Baruch Associates cited in Lee-Roy (2013) states "Among so-called services, a country's ability to manage and use information will be the single determinant of its rate of development".

In adding values to life; improving the intellectual status of man, research on the other hand helps to increase human knowledge and understanding of events, activities, phenomena and problems existing in his environment. For the folks who oppose the reality of research being the bedrock of global development might find reason here to re-write their theory. When theories are propounded, research helps to provide dependable data which will be used to explain and support such principles or theories (John, 2009).

Economy: The research process leads to better and improved practices in the various spheres of the economy. Results of research works reveal those areas in various professional practices that seem to be ineffective and put forward measures for improving them. For

example, research has shown that the heavy ultra violet ray and x-rays emitted by machines are detrimental to health as they cause mutation (sudden change in the genetic composition). So, owing to this discovery, efforts have been made to educate radiographers on the protective measures as well as educate the masses who are recipients of radiological examinations to cover themselves with aprons and their likes to avoid the penetration of the hazardous rays. Through research also, it was found that cancerous cells could also be killed with these rays considered hazardous. Further research reveals too, that the rays would not only kill the abnormal cells but also kill the normal ones. So, its concomitant side effects are bound. Many countries today which are regarded as developed countries are called so because over time they have embraced the three unequal concepts of developmental bedrock, namely-technology, research and innovation (Sharon, 1994).

Environmental protection: In the area of solving environmental problems of man for instance, with the innovations and research in modern technologies we can now reuse substances or objects that otherwise constitutes serious environmental hazards to man, through both air, water and land pollution. With technological innovations, a lot of developmental heights have being achieved. We can now produce automobiles that have less emission of hazardous gases thus, preserve our ozone layer and ecosystem in general while enhancing better conditions for the living. With growth in the economy, there's an increasing opportunity for research-oriented jobs which provide employment of researchers. According to Virginia (2009), the ultimate goal of research is to provide valid answers to questions, valid solutions to problems and to provide new body of knowledge. Research aims at providing insight on existing problems inherent in a system and how to solve them, discovery of facts about a phenomenon, development of new and better instruments and methods employed in various places of work and human endeavours. Most technological breakthroughs are products of research.

Agriculture: According to Richard R. Harwood of Michigan State University, cited in Robert (2004) "Because the world is facing a shrinking land base and growing demand for agricultural products, the output per unit area of the food and feed grains, as well as starchy vegetables, must more than double over next 25 years. While there is considerable scope for increasing yields within the existing genetic potentials, scientific breakthroughs will be needed to fully achieve the needed yields". If the agricultural sector must meet the increasing demand for food, there is every need to embrace new technologies that can increase the yield.

Education: Technology, research and innovation has no doubt made education easy. For instance, with such products as projectors, models, computers and internet facilities, better teaching aids and methods have being embraced which allows the students to have visual concepts of most of what is being taught in class especially in areas of medical and engineering. Technology has reduced the rate of illiteracy globally through online programmes which affords many people the opportunity of being educated while still maintaining their jobs.

Synthesis: towards a conception, explication and fusion of terms

Having exposed some of the variegated notions of some thinkers in thesis and their antagonistic views in antithesis; here, we shall therefore, marry both arguments and narrow genuine and significant meanings they convey, thereby paint a good picture of global development through research, technology and innovation.

However, efforts have been made never to bend the strong holds of any category of thinker, but to complement and modify their notions we would make effort to strike a balance between the merits and demerits.

Technology

We can't fully define technology without innovation/knowledge and science. Therefore, we can say that science is the study of knowledge which can be made into a system which depends on seeing and testing facts or can be studied at a closer look on nature and behavior

of natural things and the knowledge that we obtain about them; while technology is the activity of using scientific knowledge for practical purposes (the practical application of scientific knowledge). Science deals with imagination and discovery of ideas, while technology is concerned with the creativity and inventions of material which are products of scientific research. Appropriate technology which is defined as " technology tailored to fit the psychosocial and biophysical context prevailing in a particular location and period" is the only panacea for global development (Willoughby, 1990)

Research

On daily basis, human beings are faced with numerous problems. These problems are educational, psychological, economical, social, and business-oriented in nature. In order to surmount these obstacles, man has to take definite steps. One of the most important methods of solving problems is through research. What then, is research?

By definition, research is a planned and systemic process of collecting, presenting, analyzing and interpreting data for the purposes of arriving at dependable solutions to human problems (Polit and Beck, 2010). In other words, research is a systematic and objective recording and analysis of controlled observations that may lead to the development of generalizations, principles or theories, resulting in prediction and possibly ultimate control of events.

The perturbing concern of ours now is how the aforementioned concepts have skyrocketed global development. Hold your patience for yet a better explication of the subject matters here. We shall delve in to their roles in global development in the later pages of this write-up.

A good research work has some qualities which counteract some arguments laid by those who oppose the possibility of research, technology and innovation being the bedrock for global development.

One of these qualities is that it must be problem solving in orientation. It must be directed towards solving societal problems for it to be meaningful. So here, we could see that every research work is channeled towards a convergent thinking that would bring forth solutions to our life problems. Maybe, those who argue that research and technology have done more harm than good might not be far from judging wrongly. This is because, for research to be called as so, it must have the ability to provide solutions to our challenging life time situations.

A good research is self-correcting in nature, and has the ability to stimulate further studies. An error might be made in an environment; this would stimulate the inquisitive man to dig deep and find out the rationale behind such anomaly, he would go on further studies and research so as to come back and make a change.

No doubt there is great reliance today on technology to solve both environmental, medical and economic problems of man around the world. But how could such technology with higher capacity for solving man's problems be produced or invented without innovations and research. Technology, research and innovations are three concepts that cannot be easily separated if global development must be attained.

Conclusion: As Robert cited above will always say: "Adopting appropriate technologies leads directly to higher productivity, which is the key to growth. In societies that have large stock and flows of knowledge, virtuous circles that encourage widespread creativity and technological innovation emerge naturally, and allow sustained growth over long periods. In societies with limited stocks of knowledge, bright and creative people feel stifled and emigrate as soon as they can, creating a vicious circle that traps those who remain in a more impoverished space. Such societies stay mired in poverty and dependency". We can at this point rhetorically ask: what can the world do without research, technology and Innovation? These are bedrocks for global developments.

References

[1.] Barry, C. (1972) *The Closing Circle: Nature, Man and Technology*. Bantam Books, Toronto.
[2.] Cramer, j. and Zegveld, W. C. L. (1991) The future Role of Technology in Environmental Management. Futures, Vol.23 No5. Pp461-462.
[3.] Fongwan, S. (2013) The Concept of Globalisation. The Paragon Magazine, Vol. 2 pp. 58
[4.] John, O. (2009) Business Research and Methodology. Meteson Publicity Company, Enugu.
[5.] Jubel D'Cruz (2012) The Best Proverbs. Better yourself Books, Mumbai.
[6.] Lee-Roy, C. (2012) *The Role of Science and Technology in the Developing world in the 21st Century*. Retrieved from: www.ieet.org/index.phd/IEET/more/chetty20121003
[7.] Lee-Roy, C.(2013) The Importance of Technology in Economic and Social Development. Retrieved from: www.fairobserver.com/region/africa/importance-technology-economic-and-social development/
[8.] Polit, D. F. and Beck C. T (2010) Essentials of Nursing Research: Appraising Evidence for Nursing Practice. Seventh Edition. Wolters Kluwer Health/ Lippincott Williams and Wilkins.
[9.] Robert, M. W. (2004*) Marshaling Technology for Development: Proceeding of a Symposium*. National Academy Press.
[10.] Sharon, B. (1994) *The Role of Technology in Sustainable Development*. Technology and Society, Vol.13, No 4. pp. 14-19.
[11.] Virginia, I. O (2009) Concise Text on Research Methods and Elementary Statistics. 2nd Edition, Ocean Press, New Market Road Enugu.
[12.] Willoughby, K. (1990) *Technology Choice: A Critique of the Appropriate Technology Movement*. Westview Press, Boulder.

An Assessment of Work Stress among Secondary School Teachers in Gboko Local Government Area of Benue State, Nigeria

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Abstract

Background*: Teachers' job is fast becoming more stressful in recent times, and this tends to affect the level of teaching effectiveness. Stress may be conceptualized as a complex, multivariate process, resulting from a broad system of variables involving inputs, outputs, and the mediating activities of appraisal and coping.*

Objective: *The main objective of the study was to determine work stress among secondary school teachers in Gboko Local Government Area of Benue State. Specifically to determine the major stressors among secondary school teachers in Gboko L.G.A of Benue state, to identify the effects of these stressors on the health of secondary school teachers in Gboko L.G.A of Benue state and to identify the various methods of stress coping strategies used by secondary school teachers in Gboko L.G.A of Benue State.*

Methodology: *Cross-sectional descriptive survey design was used for the study to determine the work stress among teachers in Gboko L.G.A of Benue State. A total of 5 teachers (respondents) each from the randomly selected 39 secondary schools were selected to make a total of 195 sample size. The instrument of the study was questionnaire and formulated hypothesis was tested using chi-square*

Results: *The findings showed that secondary school teachers in Gboko L.G.A were experiencing stress in their teaching job as nearly all the teachers agree with items identified in the instrument as stressors. Inadequate salary, delayed payment of salary, delayed promotions; involuntary transfers are among poor working conditions considered highly or extremely stressful to the respondents.*

Conclusion: *The stress experience was found to have both physical and mental effects on the respondents. The findings also revealed that the secondary school teachers frequently use the active behavioral and inactive (escape) strategies in managing stress 2*

Background of the study

Teaching is perceived as the oldest and the noblest of all professions. Akindutire (2011) posited that teaching are those actions by the teacher and the learner that make learning successful than it would have been without such teaching. The extent to which the objectives of teaching are achieved determines teaching effectiveness. This is why a very good teacher ensures that the objectives of teaching are achieved at the end of his teaching. However, it appears that many teachers have not been effective in Benue State in recent times. Many factors have been adduced for the ineffectiveness of teachers in the state but the most prominent among them appears to be the stress experienced by the teachers (researchers' observation).

Teachers' job is fast becoming more stressful in recent times, and this tends to affect the level of teaching effectiveness. Stress may be conceptualized as a complex, multivariate process, resulting from a broad system of variables involving inputs, outputs, and the mediating activities of appraisal and coping (Lazarus, 2006; Lazarus, DeLongis, Folkman and Gruen, 2008).Stress as viewed by Olley (2009) is the psychological, physiological and behavioral response of an individual seeking to adopt and adjust to both the internal and external pressures.

In most third world nations, the educational systems have always seemed to be tied to a life of crisis occasioned by shortage of funds, teachers, classrooms, teaching materials and shortage of virtually everything except students. Hence, the teachers could be identified as the ones most susceptible to stress. In recent times in Nigeria, the working life of teachers and school administrators seem be characterized by conflicts, anxieties, frustrations, aggressions, angers, fears, hostilities and job insecurity. All these lead to tension.

Medical researchers have shown that there were no better explanations of why heart disease strikes millions of people, why hypertension takes such a great toll or why arthritis and rheumatic fever wreck devastation other than because of stress (Kemeny, 2007; Galvas and Weinberg, 2006; Okoro, 2004). Hence, there is the need for a study of this nature to help find out the major stressors and their effect on the health of Nigerian school teachers with a view to making some possible suggestions for reducing the stresses and helping people to cope with their jobs. 3

Therefore, this study attempts, to investigate the major stressors on teachers in some selected secondary schools in Gboko L.G.A of Benue State with a view to raising the level of awareness about the potential dangers of stress and the various techniques of coping with and reducing stresses.

Objectives of the study

1. To determine the major stressors among secondary school teachers in Gboko L.G.A of Benue state.
2. To identify the effects of these stressors on the health of secondary school teachers in Gboko L.G.A of Benue state.
3. To identify the various methods of stress coping strategies used by secondary school teachers in Gboko L.G.A of Benue State.

Hypothesis

Ho1 There is no significant relationship between gender and effect of stress on the mental health of the teachers in Gboko L.G.A of Benue state.

Methodology

Research Design

Cross-sectional descriptive survey design was used for the study to determine the work stress among teachers in Gboko L.G.A of Benue State.

Settings for the Study

The study was conducted at Gboko L.G.A. of Benue State. Gboko L.G.A comprises five major towns or clan namely; Ipav, Yandev, Mbayion, Mbatiav, and, Mbatyerev. Gboko L.G.A has about 65 secondary schools. The people are mainly Tiv speaking citizens and their major occupation is farming.

Study Population

The target population consists of all teachers in secondary schools in Gboko L.G.A of Benue State. Gboko L.G.A has about 65 secondary schools comprising of all government secondary schools.

Sample and Sampling Techniques

A total of 39 schools were randomly selected from the 65 secondary schools found in Gboko L.G.A. of Benue State. Then, 5 teachers (respondents) each from the randomly selected 39 secondary schools was selected to make a total of 195 sample size. 4

Method of Data Collection

A total 195 questionnaires were distributed to respondents by the researchers with help of three trained research assistants using simple random sampling technique. The questionnaires

were given to the respondents at their respective schools and same retrieved them subsequently.

Method of Data Analysis

Data was analyzed after collection by the researchers using descriptive and inferential statistics (simple frequencies, percentages and chi-squares was used for testing the relationship at 0.05 level of significance). All data were presented in table

Results

Table 1: Socio-demographic data of the Respondents

S/N	***Items***	***Variables***	***Frequency***	***Percentage%***
1	*Sex*	*Male* *Female*	*95* *100* *195*	*49* *51* *100*
2	*Age bracket*	*18-23* *24-28* *29-33* *34-38* *39 and above*	*40* *55* *36* *40* *24*	*21* *28* *18* *21* *12*
3	*Marital status*	*Single* *Married* *Divorce*	*124* *71* *0*	*64* *36* *0*
4	*Educational qualification*	*Secondary* *certificate* *NCE* *OND/HND* *Degree* *Masters*	*0* *96* *52* *45* *0*	*0* *49* *27* *23* *0*
5	*Teaching experience*	*1-4 years* *5-8 years* *9-12 years* *13-16 years* *17 years and above*	*74* *43* *38* *28* *12*	*38* *22* *19* *14* *6*
6	*How many subjects do you teach in the school?*	*1* *2* *3* *4*	*90* *102* *3* *0*	*46* *52* *2*
7	*How many times in a week do you normally have classes*	*1-3* *4-7* *8-10*	*50* *138* *7*	*26* *71* *4*
8	*Which of the following represent your salary scale*	*5,000-10,000* *11,000-20,000* *21,000-30,000* *31,000-40,000* *41,000 and above*	*35* *97* *63* *0* *0*	*18* *50* *32*
9	*Do you think your payment commensurate with qualification and work?*	*Yes* *No*	*0* *195*	*0* *100*
10	*Do you experience stress related to your work?*	*Yes* *No*	*195* *0*	*100* *0*

Source: ***Research survey****, 2013.*

From table 1, 49% of the respondents were male, while 51% were female. The table also shows that 21% of the respondents were between the ages of 18-23 years, 28% were between the ages of 24-28 years, 18% were between the ages of 29-33 years, 21% were between the ages of 34-38 years, while 12% of the respondents are between the ages of 39 and above.

On the respondents' marital status the table shows that 64% of the respondents were single while 36% are married. In respect of the educational qualification, 49% of the respondents have NCE, 27% have OND/HND while 23% of the respondents have degree. The table also shows that 38% of the respondents has 1-4 years of teaching experience, 22% has 5-8 teaching experience, 19% of the respondents has 9-12 years of teaching experience, 14% of the respondents has 13-16 years of teaching experience, while 6% have 39 years and above of teaching experience.

In respect of the number of subjects each teacher teaches, the table shows that 46% of the respondents teach one subject, 52% teaches two subjects, while 2% teaches three subjects. The table also shows that 26% of the respondents do have 1-3 lessons in a week, 71% was having 4-7 lessons in a week, while 4% was having 8-10 lessons in a week.

The table also shows that 18% of the respondents received monthly salary of #5-10,000.00, 50% of the respondents received between #11-20,000.00 while 32% of the respondents received between #21-30,000.00. The table also shows that 100% of the respondents believe that their monthly payment does not commensurate with their qualification and work. The table also shows that 100% of the respondents agree that they have work related stress.

Table II: Stressors on the teachers

S/N	***Items***	***Responses***	***Percentage%***
1	*Inadequate salary*	*195*	*100*
2	*Delayed payment*	*138*	*71*
3	*Skip in promotion*	106	*54*
4	*Delayed promotion*	96	*49*
5	*Job Insecurity*	186	*95*
6	*Involuntary transfer*	115	*59*
7	*Distance to school*	69	*35*
8	*Family problems*	65	*33*
9	*Pressure of work*	195	*100*
10	*Noisy and disruptive students*	128	*66*
11	*Poor work attitude of students*	96	*49*
12	*Personal Problems*	54	*28*
13	*Unfulfilled social expectation*	110	*56*

Source: ***Research Survey, 2013***

From table ll, 100% of the respondents indicates that inadequate salary constitute their stressor, 71% pointed out that delayed in payment is their major stressor, 54% of the respondents said that skip in promotion is a major stressor to them, 49% agree that delayed promotion as the major stressor to them, 95% said that job insecurity as the major stressor to them, 59% reported involuntary transfer as their major stressor, 35% of the respondents also said that long distance to the school as their major stressor, 33% of the respondents said that family problems constitute their major stressor, 100% said that pressure of work constitute their major stressor, 66% said their major stressor is noisy and disruptive students, 49% of the respondents said their major stressor is poor work attitude of students, 28% said their major stressor is personal problems while 56% of the respondents said their stressor is unfulfilled social expectation.

Table III: Effect of Stressors on the physical health of teachers

S/N	***Variables***	***Frequency***	***Percentage%***
1	*Fever*	*187*	*96*
2	*Body pains*	*195*	*100*
3	*Stomach upset*	*99*	*51*
4	*Frequent colds*	*75*	*38*
5	*Fatigue/Dizziness*	*195*	*100*
6	*Procastinating/neglecting responsibilities*	*32*	*16*
7	*Sleeping too much or too little*	*135*	*69*
8	*Loss of sex drive*	*45*	*23*
9	*Rapid heart beat*	*55*	*28*

Source: ***Research Survey, 2013***

From table III, 96% of the respondents said the effect of the stressors on their physical health is fever, 100% said is body pains and headache, 51% said is stomach upset, 38% of the respondents said is frequent colds, 100% said is fatigue and dizziness, 16% said is procrastinating or neglecting their responsibilities, 69% said it 7 makes them sleep too much or too little, 23% said it makes them have loss of sex drive, while 28% said it makes them have rapid heartbeat.

Table V: Stress management methods employed by the respondents

S/N	***Variables***	***Frequency***	***Percentage%***
1	*Engage in physical exercise*	*98*	*50*
2	*Watch television/films*	*125*	*64*
3	*Try to avoid situations/people that causes stress*	*195*	*100*
4	*Using alcohol, cigarettes or drugs to relax*	*68*	*35*
5	*Isolating yourself from others*	*100*	*51*

Source: ***Research Survey, 2013***

From table IV, 50% of the respondents said they manage their stress by engaging in physical exercise, 64% said is by watching films, 100% of the respondent said is by avoiding situations and people that causes stress, 35% said is by use of alcohol, cigarettes or drugs to relax, while 51% of the respondents said is by isolating themselves from others.

H01. Relationship between Gender Stressors on the mental health of teachers

S/N	***Variables***	***Gender***		***Total***	***Statistics***	***Remarks***
		Male (n=95)	*Female(n=100)*			
1	*Irritability/Short tempered*	*93(101.01)*	*92(83.95)*	***185***	*X2c=5.4780 X2t=11.0705*	*Null Hypothesis is rejected*
2	*Feeling overwhelmed*	*81(84.66)*	*74(70.34)*	***155***		
3	*Depression/general unhappiness*	*78(73.74)*	*57(61.26)*	***135***		
4	*Agitation/inability to relax*	*94(98.31)*	*86(81.69)*	***180***		
5	*Inability to concentrate*	*74(68.27)*	*51(56.73)*	***125***		
6	*Forgetfulness*	*53(46.97)*	*33(39.03)*	***86***		
	Total	***473***	***393***	***866***		

The calculated x^2 is 5.4780 while the tabulated value of x^2 (11.0705), df = 5, p = 0.050.

Since the calculated of value x^2 is less than the tabulated value of x^2, the null hypothesis is rejected. By rejecting the null hypothesis, we therefore, conclude that there is a significant relationship between gender and effect of stress on the mental health of the teachers in Gboko L.G.A of Benue state. 8

Discussion of findings

Socio-Demographic Data

Table 1 revealed that 49% of the respondents were male, while 51% were female. This implies that majority of the respondents were female. On the respondents' age the study revealed almost equal proportion of age distribution with age 24-28 carrying the highest percentage (28%), those between the ages of 18-23 and 34-38 were having the same percentage of (21%), while 12% of the respondents were between the ages of 39 and above. This implies that most of the respondents were within their middle adult age in which one is more capable of managing stress. 38% of the respondents had 1-4 years of teaching experience, 22% has 5-8 teaching experience, 19% of the respondents has 9-12 years of teaching experience, 14% of the respondents has 13-16 years of teaching experience, while 6% has 39 years and above of teaching experience. This lack of many years of teaching experience could be as a result of lack of job satisfaction secondary to stress in teaching hence, even while teaching at secondary level many are still looking for better less stressed job.

Regarding subjects each teacher teaches, the study revealed that 46% of the respondents teaches one subject, 52% teaches two subjects, while 2% teaches three subjects. 26% of the respondents do have 1-3 lessons in a week, 71% was having 4-7 lessons in a week, while 4% was having 8-10 lessons in a week. Having so many lessons in a week as displayed by majority of the respondents (71%) explains added reasons for teachers stress at secondary school level.

On the remuneration of the respondent, 18% of the respondents received monthly salary of #5-10,000.00, 50% of the respondents received between #11-20,000.00 while 32% of the respondents received between #21-30,000.00. The table also shows that 100% of the respondents believe that their monthly payment does not commensurate with their qualification and work.

What are the major stressors on the secondary school teachers in Gboko L.G.A of Benue state?

Table 2 shows that 100% of the respondents reported inadequate salary and pressure of work constitute their stressor, 95% indicated that job insecurity is a major stressor to them, 71% acknowledged delayed in payment of their salary as their major stressor, 66% reported noisy and disruptive students, 59% said involuntary transfer as their major stressor, 56% of the respondents said their stressor is about their unfulfilled social expectation, 54% said skip in promotion as major stressor to them, 49% agree that delayed promotion and poor work attitude of students as a major stressor to them, 35% of the respondents said long distance to the school is their major stressor, 33% of the respondents said that family problems constitute their major stressor, while 28% said their major stressor is personal problems.

These findings showed that secondary school teachers in Gboko L.G.A of Benue State experience considerable stress in their work and that, age, qualifications, gender and teaching experience do not matter on how the teachers perceive stress as most of the respondents agree with the items measuring their stressor. This finding agrees with study findings by Aralu (2012) on "Sources of stress and stress management strategies among secondary school teachers in Onitsha Urban" using population of 1820 teachers, which showed that generally, the secondary school teachers agreed with all the items that measured their sources of stress and also stress management strategies. The finding of this study is also in agreement with Melinda et al (2004) who identified sources of teachers stress to include: students, difficult parent/ teacher relations, social and personal pressures, economic pressures, and the school as a stressful workplace.

What are the effects of these stressors on the health of the secondary school teachers in Gboko L.G.A of Benue State?

From the table III, 100% of the respondents said that the effect of the stressors on their physical health is body pains and headache, fatigue and dizziness, 96% said that the effect of their physical health is fever, 69% said it makes them sleep too much or too little, 51% said is stomach upset, 38% of the respondents said is frequent colds, 28% said it makes them have rapid heartbeat, 23% said it makes them have loss of sex drive, while 16% said is procrastinating or neglecting their responsibilities.

This finding could be because of the exhausting effects of stress on the body system owing to the fact that during stressful state, the individual tends to utilize his thinking abilities above normal thus leaving the system exhausted. This findings agreed with that of Christian(2012) who identified aches and pains, diarrhea or constipation, nausea and dizziness, loss of sex 10 drive and frequent colds as some of the physical effects of stress on the victims. Carson and Heth (2007), Judy (2013) identified similar effects of stress on the physical health of the victim among other things to include: back pain, chest pain, cramps or muscle spasms, erectile dysfunction, headache, sleeping difficulties, stomach upset.

From table III, 100% of the respondents said stressors had affected their mental health by making them have apathy and loss of interest in work, 95% of the respondents said stressors have affected their mental health by making them feel irritable and short tempered, 92% said the effect on their mental health is feeling of agitation and inability to relax, 79% said it makes them feel overwhelmed, 69% of the respondents said it causes them depression and general unhappiness, 64% said it causes them inability to concentrate, 45% said the stressors has caused them to be forgetful, while 17% said the stressors has made them have poor judgment and reduced mental capability.

This findings agrees with Christian (2012) who identified the following as some of the effects of stress on the mental health of the victim: memory problems, inability to concentrate, poor judgment, seeing only the negative, anxious or racing thoughts and constant worrying, irritability or short tempered, and general unhappiness or depression. Carlson and Heth (2007), and Judy (2013) also identified irritability, anger, anxiety, depression, forgetfulness, sadness and fatigue among other things as the effects of stress on the mental health of an individual.

What methods of stress copping strategies employed by the secondary school teachers in Gboko L.G.A of Benue State using?

In table IV, 100% of the respondent said they manage their stress by avoiding situations and people that causes stress, 64% said is by watching films, while51% of the respondents said is by isolating themselves from others. 50% of the respondents said they manage their stress by engaging in physical exercise, and 35% said is by use of alcohol, cigarettes or drugs to relax.

The finding agrees with Study carried out by Arikewuyo(2010) on “Stress Management Strategies of Secondary School Teachers in Nigeria” using a total of 3466 teachers, drawn from secondary schools in Ogun State of Nigeria, which indicates that teachers frequently use the active behavioural and inactive (escape) strategies in managing stress. While the majority of the teachers never engage in physical exercises or, say, watch films in order to manage any stressful situation, they prefer to keep away from any situation that could cause stress, as well as endeavouring to separate themselves from people who cause stressful situations. The 11 findings also agree with Jeanne et al (2012) who identified the followings among other things as some better ways of managing work related stress: avoidance of nicotine and moderate intake of alcohol, getting enough sleep, and regular exercise. European Agency for Safety and Health at Work (2013) recommended the followings as better ways of managing stress which is in agreement with the findings of this work: moderate exercise, avoidance of alcohol and drugs consumption otherwise cut down, and making time for relaxation.

Recommendations

Based on the findings of the study, the researcher has the following recommendations to make;

1. Both government and proprietors of private schools should put more effort at ensuring prompt payment of the teacher's salary.
2. Teachers should also reduce work related stress by prioritizing, creating a balance schedule, and organizing their work.
3. Government should ensure that teachers are being paid salaries which commensurate to the work they do.
4. Before going into the class, the teacher can reduce work related stress by being centered, practice stress relief regularly and laugh with the class while in the class.
5. Government and proprietors of private schools should employ more teachers to reduce work stress among teachers which are secondary to work overload due to shortage of teachers.
6. Government should put more effort in granting teachers loans in order to assist them meet up with their social expectations.

References

[1.] Akindutire (2011) The Teaching Profession. Ado-Ekiti. Green Line Publishers.
[2.] Aralu, G. N.(2012) "Sources of stress and stress Management Strategies Among Secondary School Teachers in Onitsha Urban". Retrieved from www.google.com on 22/06/2013.
[3.] Arikewuyo, M. O.(2010) Stress Management Strategies of Secondary School Teachers in Nigeria. Journal of Educational Research, vol.46 No 2 p.195-207.
[4.] Carlos, N. R and Heth, C. D(2007) Psychology the Science of Behaviour. 4th edition Upper Saddle River, New Jersy: Pearson Education Inc., 527.
[5.] Christian, N.(2012) "What is Stress? How to Deal With Stress". Retrieved from www.question.com/freetrial on 10/07/2013.
[6.] European Agency for Safety and Health at Work (2013) "What Causes Work-Related Stress in Teachers?"Retrieved from www.ask/help.com on 22/06/2013.
[7.] Glavas, M. M., Weinberg, J (2006) "Stress, Alcohol Consumption and the Hypothalamic-Pituitary-Adrenal Axis". In Yehuda, S., Mostofsky, D. I. Nutrients, Stress and Medical Disorders. Totowa, NJ: Humana Press pp.165-183.
[8.] Jeanne,S., Melinda,S., Lawrence,R., and Robert, S(2012) "Stress at Work: Tips to Reduce and Manage Job and Work Stress" Retrieved from www.helpguide.org on 22/06/2013.
[9.] Judy, M.(2013) "Five Daily Rituals to Manage Work Stress". Retrieved from www.medline.com on 22/06/2013
[10.] Kemeny, M. E.(2007) "Understanding the Interaction Between Psychosocial Stress and Immune-Related Diseases: A Stepwise progression. "Brain, Behaviour, and Immunity, 21(8),1009- 1018
[11.] Lazarus, R. S., DeLongis, A., Folkman, S., & Gruen, R. (2008). Stress and Adaptation Outcomes: The problem of Confounded Measures. *The American Psychologist* 40(7):770-85.
[12.] Lazarus, R. S.(2006) Psychological Stress and the Coping Process. New York: McGraw-Hill
[13.] Melinda, S., Robert, S., and Jeanne, S,. (2004) Stress Symptoms, Signs and Causes. Retrieved from www.helpguide.org on 22/06/2013.
[14.] Okoro, I. O. (2004) *Stress Management and Dieting*. A lecture delivered on the occasion of the opening of the 2004/2005 Legal Year at Concorde Hotel, Owerri 14th Oct 13
[15.] Olley, B. O. (2009) Perceived Stress Factors and Coping Mechanisms Among Mothers of Children with Sickle Cell Disease in Western Nigeria. Retrieved from www.ncbi.nlm.nih.gov/pubmed/10831420

Relationship of Serum Leptin, Lactate Dehydrogenase Levels and Severity in Preeclampsia

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Abstract

Aim: *To assess whether Serum Leptin and Lactate dehydrogenase levels as an indication of severity in preeclampsia.* ***Study Design:*** *A prospective case control study, consist of two groups such as group 1 normotensive Pregnants and group 2 as cases with clinically diagnosed preeclampsia* ***Place and Duration of Study:*** *Department of Obstetrics and Gynaecology, RL Jalappa Hospital and Research Centre and Proteomics laboratory kolar, between January 2013 and July 2014.* ***Methodology:*** *A total number of 100 pregnant patients were enrolled in the present study. Amongst, normotensive and preeclamptic pregnant women Group 1 (n=50) as controls (n=50). Group-2 (n=50) were preeclampsia cases. Five ml of blood samples were collected from each normal pregnant and preeclampsia patients. Leptin levels and lactate dehydrogenase parameters were estimated using ELISA -Micro plate Reader method. Statistical analysis analysed by using SPSS Software.* ***Results:*** *The Mean ± SD values of Lactate dehydrogenase IU/L (399.04±113.08) and Leptinng/ml (9.02±4.65) in normal pregnant and Lactate dehydrogenase IU/L (1296.68±1732.95), Leptin ng/ml (23.32±8.78) in preeclampsia cases were presented. Similarly Mean ± SD values in preeclampsia were presented respectively.* ***Conclusion:*** *The elevated serum leptin levels in preeclampsia indicate endothelial dysfunction involved in the pathogenesis of preeclampsia. The relationship of serum leptin and Lactate dehydrogenase levels were increased in preeclampsia that is directly proportional to gestational age in last trimester. These biochemical parameters were significantly elevated in severe preeclampsia, mild preeclampsia and compared to normal pregnancy. Identification of high-risk patients with elevated levels of serum lactate dehydrogenase and Leptin necessitate the close monitoring for prompt and correct management which may decrease the complications of disease condition and also facilitate to reduce maternal and fetal morbidity and mortality.*

Keywords: *Preeclampsia; Leptin; Normotensive; Lactate Dehydrogenase*

1. Introduction

Preeclampsia is a clinical condition characterized by hypertension and proteinuria. This obstetric complications leading to intrauterine growth restriction, preterm delivery, maternal and fetal morbidity and mortality.[1-2] The reversible changes generally occurs in preeclampsia after delivery. It occurs in 5-7 % of the pregnancies worldwide.[3] The incidence is still higher in India of around 8-10%.[4] As per the World Health Report the maternal mortality during pregnancy and puerperium is around 12 %. In developing countries, 17% of direct obstetric deaths are as a result of hypertension.[5] The mortality rate of preeclampsia in the developing and developed countries varies approximately eight hundred women die from pregnancy and child birth related complications around the world every day.[6]

The disorder is probably multifactorial, although most cases of preeclampsia are

characterized by abnormal maternal uterine vascular remodeling by fetally derived placental trophoblast cells. Reports are available on animal models that have been used to study various aspects of preeclampsia, amongst the common model is of placental oxygen dysregulation, abnormal trophoblast invasion, inappropriate maternal vascular damage and anomalous maternal-fetal immune interactions.[7] Preeclampsia more commonly occurs in first pregnancies then subsequent pregnancies. Potential causes and mechanisms behind preeclampsia remain unknown, but maternal immune, genetic factors and placenta have been implicated. There are convincing evidences that indicates the obesity increases the risk of preeclampsia. Obesity is major disease condition observed commonly in developed countries. The relationship of obesity with respect to type2 diabetes mellitus and cardiovascular disease are studied.[8] However obesity is also having important implications for pregnancy outcomes, relating to these preeclampsia adverse outcomes are linked with obesity.

Leptin is a polypeptide hormone translated from Obesity gene located on chromosome 7. The molecular weight of leptin is 16-KD Containing 146 amino acid residues which is released from the adipocytes and placental syncytiotrophoblasts and exerts its action on binding to leptin receptor in hypothalamus to regulate energy homeostasis.[9] Leptin receptor is abundantly expressed in various maternal tissues, placenta and fetal tissues, so physiological and pathophysiological roles of leptin in pregnancy are expected. However, the role of leptin in pregnancy has not been fully elucidated yet.

Lactate dehydrogenase (LDH-EC 1.1.1.27) is an Intracellular enzyme most often measured to evaluate the extent of Cellular death due to its wide distribution in heart, liver, kidney, skeletal muscle, brain, lungs and blood cells. In Acute preeclampsia it leads to fetal mortality and morbidity with increased activity of AST and LDH.[10]

The aim of the present study focused on evaluating the Serum leptin level and LDH level in preeclampsia in comparison with the normal pregnancy to understand that can serve as a marker to assess the severity of Preeclampsia and also to plan a strategy to improve the Maternal and Fetal outcome.

2. Materials and Methods

2.1 Source of Data

2.1.1 Patients

A total number of 100 subjects were enrolled in the present study. Amongst, Group1 (n=50) normotensive pregnant women as controls. Group-2 (n=50) were preeclampsia cases. These patients were clinically diagnosed by OBG dept. of RL Jalappa Hospital and Research Centre between “January 2013 to July 2014” and were participating in the study. After obtaining approval by the Institutional ethics committee and also informed patient consent the study was carried out. A standard Sri Devaraj Urs University Proforma was used to collect the data. Five ml of blood samples were collected in to a plain vacutainer and stored at -80 ^{0}C until analysis. LDH and Leptin parameters were determined using Dry Chemistry analyzer and Sand witch ELISA method respectively.

Pregnants beyond 20 weeks of gestation were clinically diagnosed with preeclampsia as per National High Blood Pressure Education Programme working group (NHBPEP) Classification with blood pressure ≥140/90 mm of Hg and with proteinuria were included in the study group as cases. Age, gestation, and Parity matched normotensive, Non preeclamptic pregnants were also included in the study as controls.

Patients with pre-existing thyroid disease, history of renal disease and history of any metabolic disorder before or during the pregnancy, history of chronic hypertension and history of medication known to affect the thyroid function are excluded from the study.

2.2 Methods

Preeclampsia diagnosed as blood pressure of ≥140/90 mm of Hg noted for the first time during pregnancy on ≥2 occasions at least 6 hours apart, after 20 weeks of gestation with

proteinuria of ≥300 mg/24 hours or ≥ 1+ by a dipstick method in a random urine sample (NHBPEP and ACOG criteria)

2.3 Estimation of serum leptin and LDH level.

The DRG Leptin ELISA Kit is a solid phase enzyme linked immunosorbent assay (ELISA) based on the sandwich principle. The microtitre wells were coated with a monoclonal antibody directed towards a unique antigenic site on a Leptin molecule. An aliquot of patient sample containing endogenous leptin was incubated in the coated well with a specific rabbit anti Leptin antibody. A sandwich complex was formed after incubation, the unbound material was washed off and an anti-rabbit peroxidase conjugate was added for detection of the bound Leptin with the substrate solution. The intensity of color developed was proportional to the concentration of Leptin in the patient sample.

LDH is measured by Dry chemistry analyzer (Johnson and Johnson vitros 250)

2.4 Statistical Analysis

The results obtained were analyzed by using statistical tools such as Mean, SD and results on categorical variables are presented as Numbers and Percentage (%).'t' test was used to find the significance of study parameters between two groups. The level of significance between the groups were presented with P value: $0.005<P<0.10$, moderately significance with P value: $0.01<P \leq 0.05$, and Strongly significant with P value $P \leq 0.01$.

3. Results

The results obtained from the study on age group, gravid type, gestational age group distribution, blood pressure were presented in the tabular format in Table, showing details of age group, gravid, gestational age, and blood pressure between normotensive and preeclampsia group.

Accordingly, amongst the patients who visited the hospital, majority of the age group falls in the range of 18 to 30 years. The Data analysis indicated from the study group, particularly in Normotensive group, 58% were primigravida and 42% were multigravida where as in the Preeclampsia group, 66% were primigravida and 34% were multigravida observed as shown. Similarly, regarding gestational age group distribution, 80% of the normotensive patients were in the gestational age group of 33 to 40 weeks while 80% of the preeclampsia patients were in this group. The mean Systolic Blood pressure in normotensive group was 118.00±7.28 and in preeclampsia group was 154.00 ± 13.85 as mean diastolic blood pressure

Syndrome of hypertension, with proteinuria and/or edema. In majority of the patients, the clinical presentation is mild, only with a slight increase in blood pressure or proteins in the urine. Severe maternal and fetal complications such as the HELP syndrome, eclampsia, preterm delivery, abruption placenta, intrauterine fetal death or fetal growth restriction are seen in a minority of patients.

Table 1. Characteristics of the normal pregnant and preeclamptic women

Particulars	**Normotensive (N=50)**			**Preeclampsia (N=50)**	
	Age group	**Numbers**	**Percentage**	**Numbers**	**Percentage**
Age in years	18-20	12	24	12	24
	21-25	25	50	25	50
	26-30	10	20	10	20
	>30	03	06	03	06
	Weeks	**Numbers**	**Percentage**	**Numbers**	**Percentage**
Gestation age in weeks	28-32	05	10	05	10
	33-36	14	28	14	28
	37-40	30	60	30	60
	>40	01	02	01	02
	Parity type	**Numbers**	**Percentage**	**Numbers**	**Percentage**
Parity distribution	Primi gravid	29	58	33	66

	Multigravida	21	42	17	34
	Types	**Mean, SD value**		**Mean, SD value**	
Blood pressure in mm Hg	Systolic BP	118.00±7.28		154.00±13.85	
	Diastolic BP	75.60±5.77		101.40±10.50	

Maternal age is one of the essential risk factors in women with Preeclampsia. The risk of pre-eclampsia is higher when the age of pregnant women is less than 25 years[11] In the present study, the majority of the patients selected in both the groups were in the age group of 21-25 years, which comprising 50% in the control group and 50% in the preeclampsia group. However, this study shown blood pressure variation in the normotensive group was 75.60 ± 5.77 and in preeclampsia group was 101.40±10.50. As per the results of Leptin parameter, the mean value of preeclampsia group (23.32±8.78) is significantly higher and the mean value of normotensive group (9.02±4.65) and the significant P value is (p=<0.001) which is shown in table, Comparison of Thyroid hormone levels between control and preeclampsia groups.

As per the results of Lactate dehydrogenase parameters, the mean preeclampsia group levels are significantly elevated in the study group as compared to the control group. (p<0.001)whereas the mean Leptin and LDH values are comparable in the two groups. Leptin and LDH ratio clearly indicating the atherogenic potential in the preeclampsia groups table, Comparison of control and preeclampsia groups.

Table 1. Comparison of leptin and Lactate dehydrogenaselevels between normotensive pregnant and preeclamptic groups

Parameter	**Normotensive group (Mean ± SD)**	**Pre-eclampsia group (Mean ± SD)**	**p value**
Leptin	9.02± 4.65	23.32± 8.78	<0.001 **
LDH(IU /L)	399.04± 113.08	1296.68± 1732.95	<0.001 **

Table 2. Comparison of leptinand LDH Levels between Mild and Severe preeclampsia

Parameter	**±SD**	**Mild**	**Severe**	**p Value**
Leptin(ng/ml)	23.32+8.78	22.12+9.39	35+8.58	<0.001**
LDH(IU /L)	1296.68+1732.95	732.06+299.46	1538.65+2022.41	<0.001

4. Discussion

Preeclampsia is a hypertensive disorder of pregnancy caused by placental hypoxemia secondary to shallow endovascular cytotrophoblast invasion of spiral arteries. It has been regarded as one of the major causes of maternal morbidity and mortality. The frequency of occurrence of this condition is about 5-10% of all pregnant women.(young et al., 2010).[12] Preeclampsia is associated with multi organ dysfunction, that occurs due to vascular endothelial damage of maternal liver, kidney, lungs and nervous system. Blood, coagulation system and cellular dysfunction generally release excessive LDH leakage as observed in preeclampsia.[13]

In majority of the patients, the clinical presentation is severe with much increase in blood pressure and proteins in urine and associated with maternal and fetal complications such as HELLP syndrome, eclampsia, preterm delivery, abruption placenta, still born, intrauterine growth restriction etc. Maternal age is one of the essential risk factors in women with preeclampsia. The risk of preeclampsia is higher when the age of pregnant women is less than 25 years. Even in our study the majority of the patients selected were in the age group of 21-25 yrs (50%) in both the groups, followed by 18-20 yrs (24 %). The calculated mean age among the normotensive group was 23.96±3.88 and the mean age among the preeclampsia was 23.78±3.64. In a study of Kafulafula and his coworkers found that maternal age, parity and gestational age didn't show any correlation with serum leptin levels. However in our study the indicator gestational age is matching with elevated leptin level.[14]

Several studies reported that women with preeclampsia are two times expected to be primiparous as women without hypertensive disorder of pregnancy.[15-20] In our study 66 % were

primigravidae among the preeclampsia group where as 58 % were primigravidae among controls. As per observation of our study, majority of the patients were in the gestational age group of 38-40 weeks belong to 60 % in both the groups. The mean Leptin and LDH value is significantly higher in preeclampsia group as compared to normotensive group. (P value <0.001). Firstly, this study revealed that serum leptin levels increased significantly during normal pregnancy. High leptin level may be increased in women with increased gestational age because not only adipose tissue is a source of leptin, but also in pregnancy fetus, placenta, amniotic fluid, increase in plasma volume and extra vascular fluid accumulation leads to increase in maternal weight which is responsible for increase in serum leptin level.[21]

Our results are in line with those of Michael et al. (2004) who confirmed that leptin levels in preeclampsia are higher than normal pregnant as control group and with those of Singh et al. (2005) who found that leptin concentrations are significantly raised in fetoplacental tissues from women with preeclampsia.[22] Recently, Sabiha et al. (2005) showed that serum leptin levels were significantly higher in pregnant women with preeclampsia.

Conversely, Kafulafula et al. (2002) and Salomon et al. (2003) did not find any difference in serum leptin levels between normotensive and preeclamptic pregnant women and others reported that leptin concentrations were significantly lower in women with preeclampsia than in normal pregnant women (Laml et al., 2001).[23]

On the other hand, serum leptin levels showed a significant positive correlation with systolic, diastolic blood pressure and proteinuria in both mild and severe preeclamptic groups. Secondly, our study indicated that serum leptin levels increase markedly in severe preeclampsia. There was a significant increase in serum leptin levels in severe preeclamptic group in comparison with normal pregnant (3rd trimester) and mild preeclamptic groups matched for gestational age.

The results of our study are supported by those of Mise et al. (1998) who observed that plasma leptin levels were elevated significantly in pregnant women with PE. Furthermore, plasma leptin levels in the severe PE group were significantly higher than those in the mild preeclampsia group.[24]

The increase in serum leptin levels in preeclampsia may be a response to, or a result of an inappropriate trophoblastic invasion of spiral arteries (Sebiha et al., 2005).[25]

Leptin is a type 1 cytokine and its expression may be up-regulated during placentation and afterwards. It has been recently reported that the level of maternal serum leptin was increased and correlated positively with the level of TNF-α and IL-6 in preeclampsia (Bartha et al., 2001).[26]

The results of our study showed that lactate dehydrogenase levels were significantly higher in women with severe preeclampsia when compared with mild preeclampsia which is statistically significant.(P=<0.001).The elevated LDH levels in preeclampsia are also found in many other studies. Lactate dehydrogenase is an intracellular enzyme that converts lactic acid into pyruvicacid and elevated levels indicate cellular death and leakage of enzyme from the cell as shown in our study and also were supported by HS Qublan 2005.[27]

LDH may be increased due to liver damage. This endothelial vascular damage is the main cause in the occurrence of preeclampsia.

Qublan et al found in their study that LDH levels were significantly elevated in women with preeclampsia and eclampsia (<0.001). Higher LDH levels had significant correlation with high blood pressure (P<0.10) as well as poor maternal and perinatal outcome.[27] High serum LDH levels correlate well with the severity of the disease and poor outcomes in patients of preeclampsia and eclampsia. The mean gestational age at the time of delivery in his study was significantly less in patients with increasing LDH levels (P=0.025).This indicates increase in preterm deliveries in patients with higher LDH levels. The association of Low birth weight of infants with increase in serum LDH levels was suggested by He et al. in their study.[28] This was in contrary to Qublan et al. who did not find any significant association. In the present study it

was observed that there was significant association of low birth weight and increasing LDH levels (P=0.019).This could partially be due to higher incidence of premature births in this group.

Qublan HS in his study showed 92% patients had multi-organ dysfunction in severe preeclamptic women having LDH>800 IU/l. Severely preeclamptic women with LDH >800 IU/l showed significant increase in terms of eclampsia, abruptio placenta, intracranial hemorrhage, HELLP syndrome, acute renal failure, disseminated intravascular coagulation, and pulmonary edema compared with women who had lower levels ($p<0.001$).[29.] A high serum level of LDH (>1,400IU/L) were shown to have a high predictive value for significant maternal morbidity in a study conducted by Martin et al.[90] Demier et al. concluded that there was a statistically significant relation between maternal complications and high LDH levels.[30] It was noted that in early onset severe Preeclampsia, LDH levels before delivery were significantly higher in the abruption group Odendaal et al.[31]

Therefore, Measurement of serum Leptin and LDH in normal pregnant, mild preeclampsia and severe preeclampsia has become appropriate to understand and assess fetal morbidity.

5. Conclusion

The serum leptin levels are higher in preeclampsia in comparison to normotensive pregnant women that might contribute to endothelial dysfunction involved in the pathogenesis of preeclampsia. The serum leptin and Lactate dehydrogenase were increased in preeclampsia that is directly proportional to gestational age at last trimester. These two biochemical parameters were significantly elevated in severe preeclampsia condition than compared with mild preeclampsia and normal pregnancy clearly indicated to understand the extent of severity and thus can be considered as useful biomarker. Identification of high-risk patients with elevated levels of serum lactate dehydrogenase and Leptin necessitate the close monitoring for prompt and correct management which may decrease the complications of disease condition and also facilitate to reduce maternal and fetal morbidity and mortality.

Competing Interests

Authors have declared that no competing interests exist.

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References

[1.] Cindrova-Davies T. Gabor *Than award lecture* 2008: preeclampsia-From placental Oxidative stress to maternal endothelial dysfunction. Placenta 2009; 30:55-65.
[2.] Von Dadleszen, P. Mageela, Taylor, Muir J C, Stewart SD, et al. Maternal hypertension and neonatal outcome among small for gestational age infants. *Obstet Gynecol* 2005; 106:335-39.
[3.] Cunningham F G, Leveno KJ, Bloom SL, Hauth J C, Gilstrap D J, Wenstrom S Y. *Williams Obstetrics. 23rd Edition.* McGraw Hill Medical Publishing Division 2010; section VII, 34: 706-56.
[4.] Mutlu T U, Ademoglu E. Imbalance between lipid peroxidation, antioxidant status in preeclampsia. *Gynecol Obstet Invest* 1998; 46: 37-40.
[5.] Maternal mortality in 2005: estimates developed by WHO, UNICEF, UNIFPA and the World Bank, Geneva, *World Health Organization*, 2007.
[6.] World Health Organization Fact Sheet, May 2012.
[7.] Kathleen A. Pennington, Jessica M. Schlitt, Daniel L .Jackson, Laura C. Schulz and Danny J. Schust: Preeclampsia: Multiple approaches for a multifactorial disease, *disease models and mechanisms* 5, 9-18(2012).
[8.] Misra A, Khurana L. Obesity and the metabolic syndrome in developing countries. *J. of Clin Endo and Metabolism*
[9.] Ursula M, Axel M. Gressner: Endocrine regulation of energy metabolism, *clinchemis* 50:9 1511-1525 (2004).

[10.] Malarewicz A, Gruszka O, Szymkiewicz J, RogalaJ. The usefulness of routine laboratory tests in the evaluation of sudden threat of pregnant woman and the fetus in preeclampsia. *Ginekol Pol* 2006.,77(4):27684.
[11.] Procopciuc LM, Hazi GM, Caracostea G: Correlation between the TSHRc Asp727Glu polymorphism and plasma thyroid stimulating hormone levels in Romanian preeclamptic women. Gynecol Endocrinol. 2011; 27(4): 225-231.
[12.] Naglaa G, Ashraf D, Rania A, and Alaa El H: "Evaluation of serum Leptin and Androgens Levels in Preeclampsia: Relation with Disease Severity". *J. American sci* 2011. 7(9):366-372.
[13.] Rubina A, Tabassum M: "Relation between Preeclampsia and Cardiac Enzymes" *J. ARYA Atherosclerosis* 2008, 4(1): 29-32.
[14.] Yadav S, Yadav R, Saxena U. Hypertensive disorders of pregnancy and perinatal outcome. *J. Obset. Gynecol. Ind*. 1997; 17: 322-30
[15.] Coonrod D V, Hickok DE, Zhu K, Easterling T R, Daling JR. Risk factors for Pre-eclampsia in twin pregnancies: a population-based cohort study. *Obstet Gynecol* 1995; 85:645-50.
[16.] Eskenazi B, Fenster L, Sidney SA. Multivariate analysis of risk factors for Pre-eclampsia. *J Am Med Assoc* 1991; 266:23741.
[17.] Stone J L, Lockwood CJ, Berkowitz GS, Alvarez M, Lapinski R, Berkowitz RL. Risk factors for severe Pre-eclampsia. *Obstet Gynecol* 1994; 83:357-61.
[18.] Chen CL, Cheng Y, Wang PH, Juang CM, Chiu LM, Yang MJ, et al. Review of pre-eclampsia in Taiwan: a multi-institutional study. *Zhonghua Yi Xue Za Zhi (Taipei)* 2000; 63:869-75.
[19.] Odegard RA, Vatten L J, Nilsen S T, Salvesen K A, Austgulen R. Risk factors and clinical manifestations of pre-eclampsia. *Br J Obstet Gynecol* 2000; 107:1410-6.
[20.] Stamilio DM, Sehdev HM, Morgan MA, Propert K, Macones GA. Can antenatal clinical and biochemical markers predict the development of severe Pre-eclampsia? *Am J Obstet Gynecol* 2000; 182: 589-94.
[21.] Salvatores M, Gennarelli G, Menato G, Massobrio M, Leptin as a possible marker of augmented metabolic risk during pregnancy. *Minerva Ginecol* 2006; 58(1):1-10.
[22.] Singh, H.J.; Abu Bakar, A.; CheRomli, A. and Nila, A. (2005): Raised leptin concentrations in feto-placental tissues from women with preeclampsia. *Hypertens Pregnancy;* 24(2): 191-199.
[23.] Laml, T.; Preyer, O.; Hartmann, B.W.; Huecklinger, E.; Soeregi, G. and Wagenbichler, P. (2001): Decreased maternal serum leptin in pregnancies complicated by preeclampsia. *J Soc Gynecol Invest*; 8(2): 89-93.
[24.] Mise, H.; Sagawa, N.; Matsumoto, T.; Yura, S.; Nanno, H.; Itoh, H.; Mori, T.; Masuzaki, H.; Hosoda, K.; Ogawa, Y. and Nakao, K. (1998): Augmented placental production of leptin in pre-eclampsia: possible involvement of placental hypoxia. *J. of Clin Endo and Metabolism*; 83: 3225-3229.
[25.] SebihaOzkan; Cemal Tamer Erel; Riza Madazli and Kilic Aydinli (2005): Serum leptin levels in hypertensive disorder of pregnancy. *Eur J. of Obstet and Gynecol and Reprod Biol;* 120: 158-163.
[26.] Bartha, J. L.; Romero-Carmona, R.; Escobar-Llompan, M. and Comino-Del-gado, R. (2001): The relationships between leptin and inflammatory cytokines in women with preeclampsia. *BJOG*; 108(12): 1272-6.
[27.] Qublan HS, Ammarin V, Bataineh O, Al Shraideh Z, Tahat Y, Awamleh I, et al. Lactic dehydrogenase as a biochemical marker of adverse pregnancy outcome in severe pre-eclampsia. *Med Sci Monit* 2005; 11(8): CR393-CR397.
[28.] He S, Bremme K, Kallner A, et al. Increased concentrations of lactate dehydrogenase in pregnancy with Preeclampsia; a predictor for birth of small for gestational age infants. *Gynecol Obstet Invest*. 1995; 39:234-8.
[29.] Martin J N Jr, May WL, Magann E F, et al. Early risk assessment of severe Preeclampsia: admission battery of symptoms and laboratory tests to predict likelihood of subsequent significant maternal morbidity. *Am J Obstet Gynecol.* 1999; 180:1407-14.
[30.] Demir SC, Evruke C, Ozgunen FT, et al. Factors that influence morbidity and mortality in severe preeclampsia, eclampsia and HELLP syndrome. *Saudi Med J.* 2006; 27:1015-18.
[31.] Hall DR, Odendaaal H J, Kirsten G F, et al. Expectant Management of early onset, severe preeclampsia perinatal outcome. *BJOG*. 2000; 107:1258-64.

Authors' contributions:

This work was carried out in collaboration between all authors. Dr. S R. Sheela and Dr. C. D. Dayanand designed the study, wrote the protocol, and wrote the first draft of the manuscript. Dr. Uma Devi Kantipudi managed the literature searches, analyses of the study performed the spectroscopy analysis and Mr. Nagarjuna. Sivaraj managed the experimental process. All authors read and approved the final manuscript.

Dietary Practices Of Older Children With Sickle Cell Disease At The Sickle Cell Center, Benin City, Nigeria

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Abstract

Nutrient needs are higher during adolescence and those with sickle cell disease require a diet that provides plenty of calories, protein, vitamins and minerals. It is therefore pertinent to study the dietary practices of older children who are mainly adolescents with sickle cell disease. This study took place at the sickle cell center Benin City, Edo state using a cluster of clients who are adolescents within the study period of 4 weeks. Clients who participated in this study were both out-patient and in-patients.

A total of 60 clients were interviewed using an interviewer/self administered questionnaire with 51.7% females and 66.6% were 15 years or less. Although 83.3% of the adolescents reportedly take adequate diet, only 35% include fresh vegetables, 41% include fresh fruits, 15% include wheat and 17% include beans in their daily diet. Majority (68.3%) reportedly take 'special diet' only when in crisis. This study has shown that adolescents under study do not adequately eat diet that are beneficial to their health and good sources of macro and micronutrients evidenced by the poor irregular intake of fruits, vegetables, beans and wheat products though they claimed to be taking adequate diet. Consequently, emphasis need to be placed on intake of adequate nutritious diet regularly and not just the intake of 'special diet' when they are in crisis.

Keywords: Sickle cell disease, adolescents, older children, diet, nutrients

Introduction

Undernutrition has been considered as a serious complication and should be a part of the clinical care (de Franceschi et al, 2000; Tomer et al, 2001). There is also growing interest in finding nutritional alternatives to solving problems of persons with sickle cell disease but little is known about adolescent with sickle cell and their dietary practices in Nigeria. Adolescents with sickle cell disease are at risk of growth and nutritional deficiencies due to poor dietary intake (Ashara, 2013). Therefore, the purpose of this study is to assess the dietary practices of older children who are mainly adolescents with SCD.

Objective of the Study

The main objective of the study was to assess dietary practices of adolescents with sickle cell disease (SCD) attending Sickle Cell Center, Benin City (SCCBC) within the 4-week study period (October/November, 2009).

Methodology

A descriptive research design was used for this study. It was designed to assess pattern of dietary intake among older children who are mostly adolescents with SCD in view of their nutrition

Study Setting

This study was carried out in Sickle Cell Center, Sir Gabriel Avenue, Benin City, Edo State. The center is located in the Government Reserved Area (GRA) in Benin City. It was

established on Wednesday 26th of May 1993 and was commissioned by the President of Nigeria, General Ibrahim Babangida. This centre consists of both male and female wards with six beds respectively. It consists of Sickle Cell Club, with the Permanent Secretary's office and the office of Commissioner for Health, Edo State. The hospital was selected because it is a tertiary institution that renders preventive, promotive, curative and rehabilitative health care services to clients with sickle cell disease. Secondly, it has up-to-date statistical records with more focus on the sickle cell clients. It has a high patronage of sickle cell patients because of the special attention, low cost treatment and services rendered.

Target Population

The target population comprised all older children with genotype HbSS and HbSC who received in-patient and out-patient care in the Sickle Cell Center, Benin City Edo State during the 4-week period of the study, October/ November, 2009. All respondents were within 8 to 19 years.

Sample and Sampling Technique

A sample size of 60 respondents was drawn from the target population using a cluster sampling technique in which all older children who satisfy the inclusion criteria during the period of study were interviewed. The inclusion criteria are;

- Older children (8 – 19 years) who attended the outpatient clinic within the study period
- Older children (8 – 19 years) who were admitted within the period of 4 weeks (October/ November, 2009)

Instrument for data collection

Data for this study was collected using a questionnaire developed by the researcher questionnaire in order to achieve the objectives of this study. This questionnaire consists of four sections including:

1. Socio-demography data consisting of age, sex, occupation, position in family.
2. Pattern of dietary practices.

Validity of instrument

Care givers at the centre scrutinized the questionnaire thoroughly before it was administered to respondents. Expert opinions were also sought from senior colleagues who are vast in managing patients with sickle cell disease. This was done in other to ensure validity of the instrument.

Method of Data Collection

Letter of approval was given by the Chief Medical Director at the Sickle Cell Center Benin City, Edo State prior to data collection. Verbal consent of respondents was obtained prior to administering the questionnaire. The self- administered questionnaire was distributed to adolescents, who attended the outpatient clinic of the centre as well as those on admission for a period of 4 weeks (October /November, 2009). While for those who could not read the content of the questionnaire , it was interviewer administered. About 10 minutes was given to each respondents to fill the questionnaire especially those requiring re-call after which the researcher cross-checked for omissions and to explain some contents.

Method of data analysis

Data obtained was analyzed using Statistical Package for Social Science (SPSS) for window 15.0 version to generate tables and charts

Ethical considerations

Permission to carry out the study was obtained from the Chief Medical Director in Sickle Cell Center. The parent or significant other of the patient provided permission before including the patient in the study. Verbal consent of respondents was obtained prior to

administering the questionnaire. The purpose of the research was disclosed to the respondents. The sections included in the questionnaire were explained clearly in a simple language. Anonymity and confidentiality of individual respondents were maintained throughout the study.

Results

Table 1 shows the socio-demographic characteristics of respondents. Respondents between the ages of 8-11 years were 14(23.3%), 12-15 years were 26(43.3%), and 16-19 years accounted for 20(33.3%). All the respondents were students and majorities were Christian. Respondents with primary, secondary and tertiary level of education were 23(38.3%), 34(56.7%), and 3(5.0%) respectively. Regarding the birth order of respondents in the family, 25% were 1st, 16.7% were 2nd, 16.7% were also 3rd, 23.3% were 4th, and 18.3% constituted other positions in the family.

As shown in table 2, majority (83.3%) of respondents reportedly take adequate diet. Considering the frequency of daily food intake, only 1.7% reported eating once a day, 13.7% reportedly eat twice a day, 60.0% reported eating thrice a day and 25.0% reported eating four times a day. Adolescents who reported that they eat in-between meals of snacks, drinks etc were 73.3%. Majority (68.3%) reported eating special diet only when sick. Many (70.0%) of the adolescents reportedly eat what is needed to stay healthy.

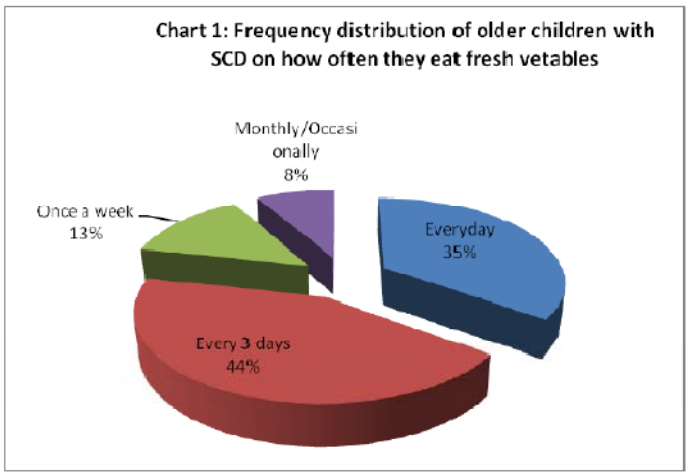
Table 1: Socio-demographic characteristics of respondents, N = 60

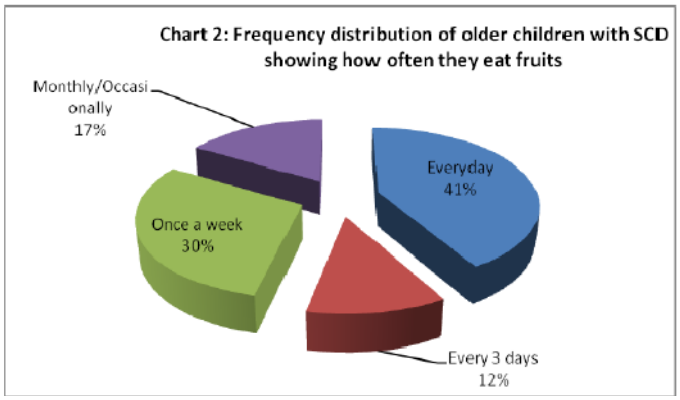
S/N	Questions	Frequency(n)	Percent (%)
1.	Age		
	• 8-11 years	14	23.3
	• 12-15 years	26	43.3
	• 16-19 years	20	33.3
2.	Sex		
	• Male	29	48.3
	• Female	31	51.7
3.	Occupation		
	• Student	60	100.0
4.	Religion		
	• Christian	57	95.0
	• Islam	3	5.0

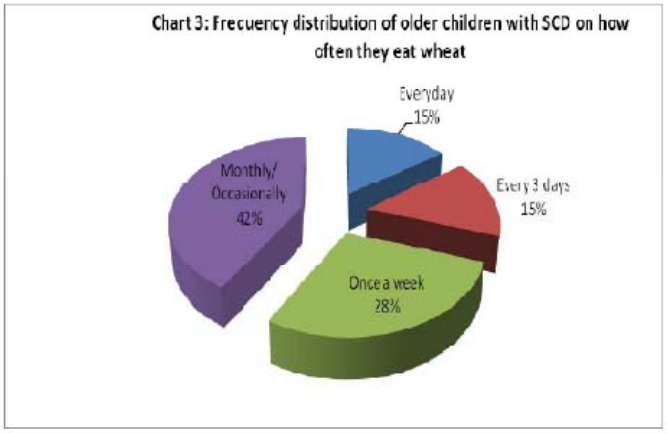
Table 2 Frequency distribution of pattern and practice of dietary intake of respondents N-60

S/N	Questions	Frequency(n)	Percent (%)
1.	Do you eat adequate diet?		
	• Yes	50	83.3
	• No	10	16.7
2.	How many times do you eat in a day?		
	• Once	1	1.7
	• Twice	8	13.7
	• Thrice	36	60.0
	• Four	15	25.0
3.	Do you eat in between meals?		
	• Yes	44	73.3
	• No	16	26.7
4.	Do you eat special diet when sick?		
	• Yes	41	68.3
	• No	15	25.0
	• Occasionally	4	6.7
5.	Do you eat only what is needed to stay healthy?		

	• Yes • No	42 18	70.0 30.0







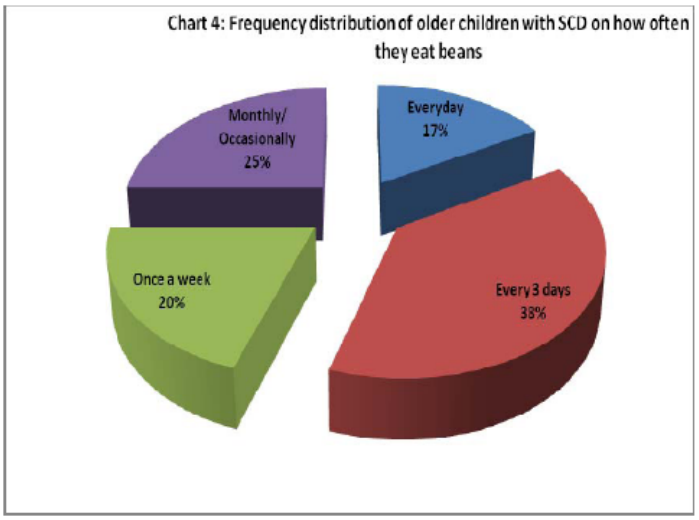


Chart 1 indicates how often adolescents with SCD eat vegetable. The highest number of respondents 26 (44.0%) indicated every 3 days, followed by 21 (35.0%) which indicated every day, 8 (13.0%) indicated once a week and only few 5 (8.0%) indicated once a month/ occasionally

Chart 2 shows that majority of the respondent 25 (41.0%) indicated everyday, 18 (30.0%) indicated once a week, 10 (17.0%) indicated once month/ occasionally and 7(12%) the least indicated every three days on how often they eat fruits

Chart 3 shows that 25 respondents (42.0%) indicated that they eat wheat in their meals only once a month or occasionally, 17 (28.0%) reported once a week, only 9 (15.0%) indicated that wheat is included in their meals everyday and 9 (15.0%) reported every 3 days.

The chart 4 shows how often adolescents in the study eat beans. Only ten (17.0%) respondents indicated that their beans intake is on daily basis while 23 (38.0%) indicated every 3 days, 12 (20%) indicated once a week and 15 (25.0%) indicated once a month/occasionally.

Discussion/Conclusion

Summary of findings

This study assessed dietary practices of older children who were mostly adolescents with sickle cell anemia at Sickle Cell Center, GRA, Benin City, Edo State Nigeria between October and November 2009. We described their socio-demographic characteristics and assessed the frequency of intake of food items such as fruits and vegetables, beans and wheat as well as in-between meals.

Socio-demographic characteristics

In this study, majority of the respondents (adolescents) were between the ages of 12-15 years and were mostly females, all of them were students and majority of these children were Christian while many had secondary level of education as expected for their age range. Respondents constitutes mostly of first and fourth born of their respective families. This study supports the fact that there is high incidence of occurrence of sickle cell disease among the fourth born of the family whose parent have a genotype AS (Aina and Onasoga, 2013).

Pattern of dietary intake of adolescents with SCD as compared to their nutritional requirements.

Patients with sickle cell anemia have greater than average requirements for both calories and micronutrients. This study showed that many of the adolescents reportedly take adequate diet and they take meals three times or more in a day. Many reported that they take in-between meals in form of snacks and drinks. Majority reported that they take “special” diet

when they are sick. This is a conflicting report as majority had initially reported that they take adequate diet. The need for a 'special' diet need not arise in the first place as all their diet should be adequate and contain essential elements not only because of the sickle cell disease but as adolescents. William et al (1997) reported that despite the fact that the adolescents are familiar with Food Guide Pyramid, most patients failed to consume appropriate amounts from those groups. Nutritional deficiencies and poor eating habits established during adolescence can have long-term consequences, including delayed sexual maturation, loss of final adult height, osteoporosis, hyperlipidaemia, and obesity from the adolescent's nutritional consideration. During sickle cell crisis, energy intake can be especially poor and this may be linked with the report of intake of 'special' diet when in crisis as reflected in this study

Most adolescents in this study do not take fresh fruits and leafy vegetables. In this study, many of the respondents eat food containing wheat only on monthly basis or occasionally. Only few take in food containing beans and beans product on daily basis.

It has been documented that a diet emphasizing fruits, vegetables, whole grains, and legumes will provide a greater proportion of essential nutrients than a typical western diet, and appropriate supplementation (1-3 times the recommended intakes for most essential nutrients) can prevent deficiency and may decrease the likelihood of disease exacerbation (Nutrition MD, 2015). The average energy intake of sickle cell patients is typically below the suggested allowance for calories during the quiescent phase of the disease and it drops to roughly half recommended levels during times of illness requiring hospitalization (Malinauskas, Gropper, Kawchak, et al., 2000). A good source of high calorie and nutrient dense (macro and micro nutrients) staple food, nationally available, and at a reasonable cost, is beans of different types. Although beans vary considerably in flavor, size, colour and shape, their nutritional composition is remarkably similar and it contains the following: calories, saturated fat, carbohydrate, protein, dietary fiber, sodium, thiamin, folic acid, copper, iron, magnesium, manganese, phosphorus, potassium. Studies have shown that vitamin-mineral supplement of certain nutrients or treatment with a combination of high-dose antioxidants can reduce the percentage of irreversibly sickled cells (Marwah S. S, Blann A.D. Rea C., et al. 2002**;** Jaja, Ikotun, Gbenebitse, et al., 2002; Ohnishi, Ohnishi, Ogunmola, 2000; De Franceschi, Bachir, Galacteros, et al. 1997; Muskiet, Muskiet, Meiborg, et al., 1991; Glew, Casados, Huang, et al., 2002)**.** Wheat is another food that is rich in manganese, phosphorus, magnesium and selenium, zinc, copper, iron and potassium and calcium. Wheat is also rich in vitamin B6, niacin, thiamin, folate, riboflavin and panthothenic acid. Vitamin E and K are also present in smaller but significant amounts. It also has phytonutrients, which promote better health through maintaining high blood cell counts (Organic Information services, 2015).

Limitation of study

We encountered poor co-operation from the respondents, as well as the general weakness of the respondent which prevented them from answering the questions posed and were without any significant other at the time of interview.

Conclusion

This study has shown that older children with sickle cell disease do not adequately eat diet that are beneficial to their health and good sources of macro and micronutrients evidenced by the poor irregular intake of fruits, vegetables, beans and wheat products though they claimed to be taking adequate diet. The health care team therefore should provide adequate information of daily dietary requirement to significant others looking after older children with sickle cell disease. This is due to the fact that older children with sickle cell disease do not practice adequate diet for the promotion of their health and minimizing the frequency of sickle cell crisis. In addition, emphasis need to be placed in intake of adequate diet regularly and not just the intake of 'special diet' when they are in crisis.

References

[1.] Aina R. O. and Onasoga O. A. (2013) Perception of Pain among adolescents with sickle cell disease in Benin city, Edo state, Nigeria. Pelagia Library: European Journal of Experimental Biology 2013, 3(1): 401-405

[2.] Ashara Calisse-Atchley Cashaw, 2013. Feasibility of a Nutrition Training Program on Improving Self-Efficacy and life skill Development for adolescents with Sickle Cell disease – Unpublished dissertation for Doctor of Psychology, Philadelphia College of Osteopathic Medicine, Depatment of Psychology.

[3.] de Franceschi L, Bachir D, Galacteros F, et al. Oral magnesium supplements reduce erythrocyte dehydration in patients with sickle cell disease. J Clin Invest. 1997;100:1847-1852.

[4.] de Franceschi L, Bachir D, Galacteros F, et al. Oral magnesium pidolate: effects of long-term administration in patients with sickle cell disease. *Br J Haematol*. 2000;108(2):284–9.

[5.] Glew RH, Casados J K, Huang Y S, et al. The fatty acid composition of the serum phospholipids of children with sickle cell disease in Nigeria. Prostaglandins Leukot Essent Fatty Acids. 2002;67:217-222.

[6.] Jaja SI, Ikotun AR, Gbenebitse S, et al. Blood pressure, hematologic and erythrocyte fragility changes in children suffering from sickle cell anemia following ascorbic acid supplementation. J Trop Pediatr. 2002;48:366-370.

[7.] Malinauskas B.M., Gropper S.S., Kawchak D.A., et al., 2000 Impact of acute illness on nutritional status of infants and young children with sickle cell disease. Journal of American Diet Association 2000:100:330-334

[8.] Marwah S. S, Blann A.D. Rea C., et al. Reduced Vitamin E antioxidant capacity in sickle cell disease is related to transfusion status but not to sickle crisis. American Journal of Heamatology, 2002:69:144-146

[9.] Muskiet FA, Muskiet FD, Meiborg G, et al. Supplementation of patients with homozygous sickle cell disease with zinc, alpha-tocopherol, vitamin C, soybean oil, and fish oil. Am J Clin Nutr. 1991;54:736-744.

[10.] Nutrition MD Healthcare Providers. 2015. Sickle Cell Disease: Nutritional Considerations. http://www.nutritionmd.org/consumenrs/heamatology/sickle_cel_nutriton.html Accessed 24/09/2015

[11.] Ohnishi ST, Ohnishi T, Ogunmola GB. Sickle cell anemia: a potential nutritional approach for a molecular disease. Nutrition. 2000;16:330-338.

[12.] Organic Information services Pvt ltd., 2015 Nutritional Value of Wheat and barley. https://www.organicfacts.net/nutrition-facts/nutritional-value-of-wheat-and-barley.html Accessed 16th October, 2015.

[13.] Tomer A, Kasey S, Connor WE, et al. Reduction of pain episodes and prothrombotic activity in sickle cell disease by dietary n-3 fatty acids. *Thromb Haemost*. 2001;85(6):966–74

Neuro Linguistic Programming Psychotherapy for Improving Emotional State: A Pilot Study

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Abstract

This pilot study was conducted for assessing efficacy of Neuro Linguistic Programming Psychotherapy in improving emotional state. NLP psychotherapy techniques used were timeline, anchoring, double dissociation, perceptual positions, reframing, metaphors, strategy change and values elicitation. NLP Psychotherapy session(s) were given to ten participants (N=10) six females and four males. Methods for data collection included personal interviews, participant's experiential report, DASS (Depression Anxiety Stress Scale) and NLP wheel of life scale. Assessment of emotional state change was done on Pre and post therapy scores of DASS (Depression Anxiety Stress Scale) and NLP wheel of life scale along with changes in experiential report of participants before and after therapy session(s). Results obtained by t-tests performed on DASS scores found statistically significant ($p<0.001$) improvement for all three categories of emotional state i.e. stress, anxiety and depression. Improvement on wheel of life scale score and subjective experience of participants was also reported suggesting that NLP Psychotherapy could improve emotional state in fewer sessions. This pilot study shows positive outcome and also adds to the sporadic literature of NLP psychotherapy as an evidence based study supported by significant statistical findings, subjective experiential improvement in emotional state of participants with up to six months follow up noting stability of resourceful changes attained.

Keywords: Neuro Linguistic Programming, Psychotherapy, Emotional State

Neuro Linguistic Programming Psychotherapy for Improving Emotional State

Integrated Neuro Linguistic Programming and personal encounter psychotherapy is found useful for making fundamental changes quickly and effectively (Bolstad R, 2002). (Gray R M Liotta R F, 2012) noted long term efficacy, speed of operation and possibility of being run content free of Visual kinesthetic dissociation protocol or rewind technique for Post traumatic stress disorder. (Wake L, Leighton M, 2014) suggests NLP's potential as a therapeutic tool in the treatment of symptoms of anxiety and depression associated with self report of PTSD and observed statistically significant ($p<0.001$) improvement in candidates' emotional state measured on three DASS (Depression, Anxiety and Stress) categories. Assertiveness skills training program of NLP strategies is reported to be highly effective in reducing state anger in a control investigation, (Tabrizi F, Shafiabadi F, Zahrakar K, 2015) consisting of a group of married women admitted to home health.

The term NLP (Neuro Linguistic Programming) was coined by Bandler and Grinder, refers to use of language of mind to consistently achieve one's specific and desired outcomes. Neuro- the nervous system (the mind) through which our internal experience is processed through five senses : visual, auditory, kinesthetic, olfactory and gustatory; Linguistic- includes language (verbal and non verbal) through which we communicate with outside and inside world and give meaning like pictures, sounds, feelings, tastes, smells and self talks; Programming- It is the ability to discover and utilize the programs (one's communication to self and others) that we run in our neurological

systems to achieve specific desired outcomes. (McWhirter, 1992) defined it as "the study of the structure of subjective experience".

NLP as a theory draws from a wide range of sources and within NLP influences from Gestalt therapy (Perls, 1969), person centered counselling (Rogers, 1961), transformational grammar (Grinder and Elgin, 1973), behavioral psychology and cybernetics (Ashby, 1965), the Palo Alto school of brief therapy (Watzlawick *et al.*, 1967), Ericksonian hypnotherapy (Bandler and Grinder, 1975b; Grinder *et al.*, 1977) and most importantly, the cybernetic epistemology of Gregory Bateson (Bateson, 1972) can be found.

Although, NLP has boomed into one of world's most popular forms of interpersonal skill and communication training there is limited, sporadic literature in this field (Tosey P and Mathison J, 2003). These include education (Craft, 2001), training and development (e.g. Lee, 1993; Thompson *et al.*, 2002; Trickey, 1997), faster learning (e.g. Sandhu, 1994; Stanton, 1994), counselling and psychotherapy (e.g. Geronilla, 1989), clinical psychology and hypnotherapy (e.g. Barnett, 1990; Field, 1990; Jupp, 1989) and management (e.g. Ashok and Santhakumar, 2002; Georges, 1996).

Bridging the gaps in literature, this evidence based pilot study analyses the efficacy of NLP in therapeutic setting for improving emotional state. Author finds this study as an useful addition to limited literature of NLP's efficacy as a therapeutic tool.

Method

Participants

A total of ten participants (four male and six female, age range 26-56 years) took part in this study. All Participants were self referred.

Data Collection

All participants were required to fill Depression Anxiety Stress Scale, the NLP Wheel of Life scale, subjective experience (brief description of how they feel) before and after therapy session. Depression Anxiety Stress Scale (DASS) is a 42 item self report instrument for measuring three related negative emotional states of depression, anxiety and stress. Change in score on each of three categories of DASS was analyzed by performing t-scores tests. NLP Wheel of Life Scale allows one to access whether too much focus is being put on one part of life and so neglecting others. NLP wheel of life assesses harmony and balance in life. The wheel is divided into sixteen sections with ranking 0-10 where 10 marks totally happy. There are many different variations of wheel of life and the one used in this study was divided into Health, Happiness, Giving Love, Receiving Love, Social Life, Partner, Living Environment, Energy, Sleep, Self Esteem, Confidence, Weight, Work, Money, Personal Development and Goals.

Procedure

NLP Psychotherapy techniques applied included rapport building, swish technique, anchoring, timeline based techniques, perceptual position, double dissociation technique, metaphors, value hierarchy elicitation, sub-modality change, parts integration, reframing, sleight of mouth patterns, compulsion blow out technique, strategy elicitation and change. Sequence and combination of NLP techniques for each participant was customized to best address to individual needs.

Results

Following tables and figure shows each participant's demographics, brief problem statement, psychotherapy technique/(s) chosen to suit each participant's needs, pre and post therapy score of all three categories of DASS.

Table 1 shows participant details(Name Code, Age, Gender) with brief problem statement and NLP psychotherapy technique used. Table 2 shows progress of participants and subjective changes with time span of follow-up for each participant. Figure 1 shows score changes in each category of DASS (Depression, Anxiety, Stress Scale) pre and post therapy. Figure 2 (a) shows NLP wheel of life score before therapy and Figure 2 (b) shows NLP wheel of life score after therapy. Follow-up of resourceful state attained was done. Follow-up of up to six months was done. Out of all ten participants five participants retained positive outcome of therapy on emotional state for up to six months, two participants were available for follow-up of only three months and one month each and three participants could not be reached for follow-up. Statistical significant improvement ($p<0.001$) was observed on Depression Anxiety Stress Scale (DASS) for all three categories of stress, anxiety and depression. NLP wheel of life was also more balanced for each participant after therapy and resourceful subjective experience of participants was also noted.

Table 1: Demographics, brief problem statement with NLP Techniques chosen for each participant respectively

Participant Code, Age, Gender	**Brief Problem Statement**	**NLP Psychotherapy technique chosen**
DuGe 26 F	Stress due to severe pigeon phobia	Double dissociation technique: fast phobia cure
PuUr 44 F	Stress in daily life and Snake phobia	Double dissociation technique: fast phobia cure combined with reframing, sleight of mouth, time based technique and metaphors.
ShRa 56 M	Panic attacks and anxiety after a traumatic incident five year ago	Time based technique and anchoring
PuCh 26 F	Stress during driving and finds it hard to remember route.	Metaphors and change in strategy
MaAb 30 M	Limiting belief of being an unhappy person, inefficient and unable to see other's perspective leads to daily stress	Value hierarchy elicitation, time based technique, reframing, perceptual position and metaphors
GrDa 27 M	Career stress due to limiting belief of having poor communication skills.	Values hierarchy elicitation, compulsion blow out, reframing and metaphors
MiAg 42 F	Limiting belief of poor performance, short temper	Sub-modality change, anchoring, time based technique
MsAt 33 F	Conflict in decision making Weight Issues	Parts Integration Swish pattern
DeAs	Difficulty moving On with	Sub modality change for limiting belief
40 F	life after a failed relationship	change, metaphors, anchoring and values hierarchy elicitation
SoRo 34 M	Stress of taking a decision at crossroads of life	Parts Integration

Table 2: Experiential Progress of participants pre and post therapy session

Participant	No. of sessions	Subjective report	Progress ±
DuGe	1	Phobia extinguished. Helped a dying pigeon reach bird care shelter some days after therapy session. Six months follow up	+
PuUr	3	Phobia cured and handles stressful events in daily life efficiently and with ease. Six months follow up	+
ShRa	1	No Anxiety as observed in future pacing during session No follow- up	+
PuCh	1	Enjoys driving and better at remembering routes Six months follow up	+
MaAb	3	Better image of self and exploring new interests Better at understanding other's esp. spouse/parents perspectives Practicing being relaxed and joyful One month follow-up	+
GrDa	1	Reaching out in career opportunities with ease focusing on individual strengths Reported value hierarchy elicitation helps him progressively in making satisfactory choices continually 3 months follow-up	+
MiAg	2	Feels Confident and better output at work Anger issues resolved Six months follow-up	+
MsAt	1	Was able to take decision in the therapy session Confident to work at resolving weight issue No Follow-up	+
DeAs	2	Joyful and Working towards self empowerment and life enrichment 6 months follow-up	+
SoRo	1	Took decision in the session No follow-up	+

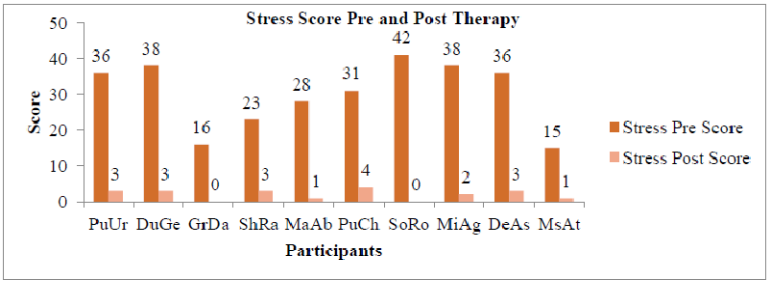

Fig 1(a) : DASS Stress Score Change

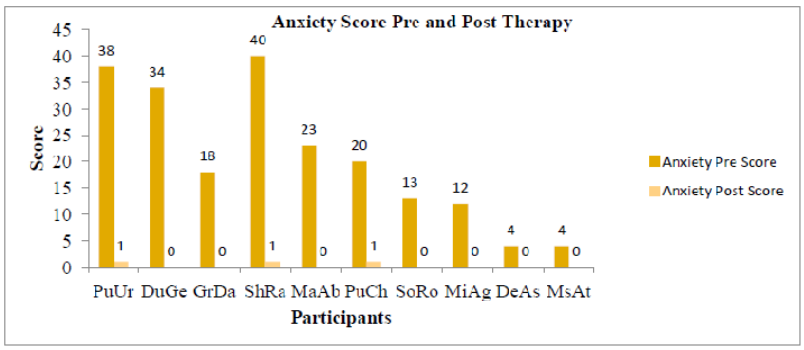

Fig 1(b) DASS Anxiety Score Change

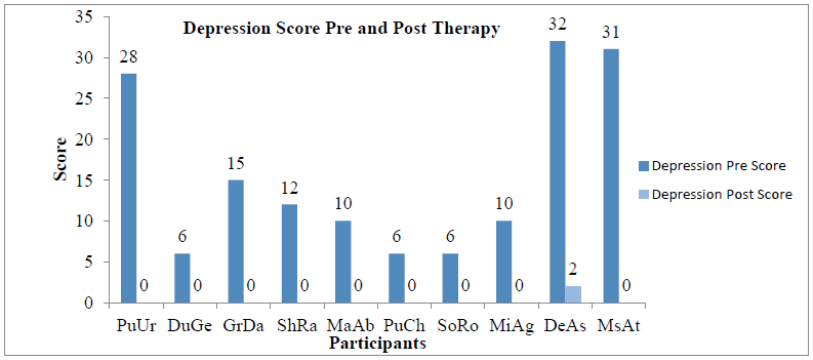

Figure 1(c) DASS Depression Score Change

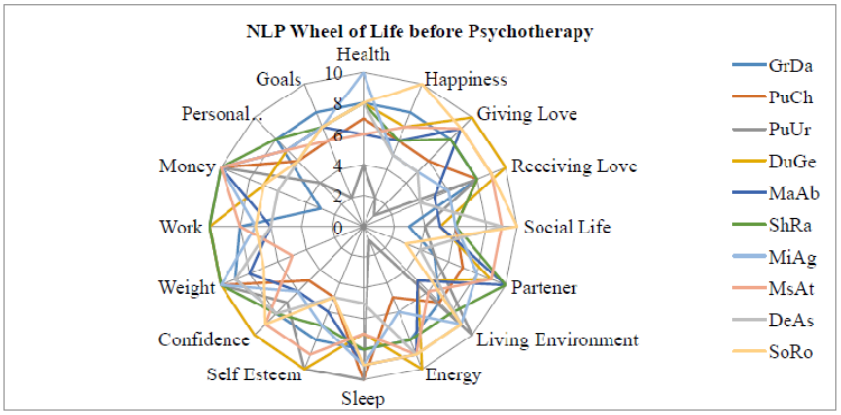

Figure 1: Graphical Analysis of Depression, Stress, Anxiety Scale Score Change

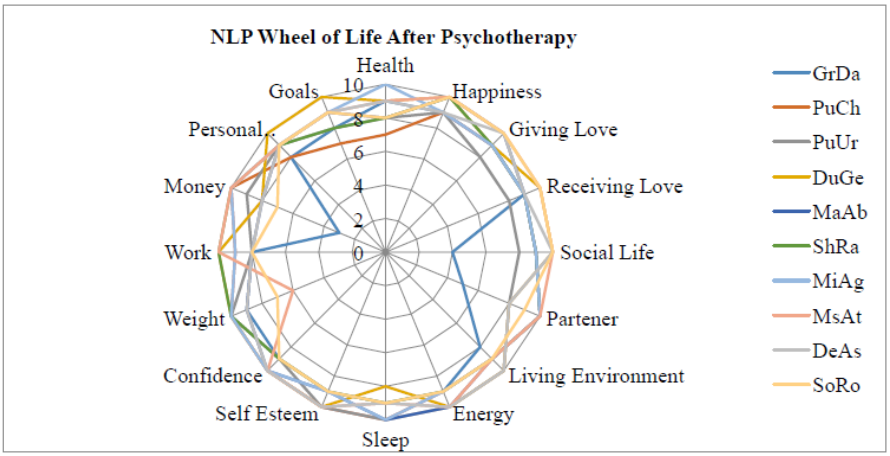

Figure 2 (a): NLP Wheel of life Scale. Each skewed circle represents a score of various categories for each participant before NLP Psychotherapy **(b):** NLP Wheel of life Scale. Each skewed circle represents a score of various categories for each participant after NLP Psychotherapy

Discussion

NLP Psychotherapy techniques used for emotional state improvement yielded positive progress reports in few sessions (maximum number of sessions required in this study was three where each session lasted for approximately sixty minutes). Improved emotional state is suggested by statistically significant improvement (p values <0.001) in all three categories of DASS along with more balanced wheel of life scale after NLP therapy session. Participants validated the statistical findings with experiential resourceful progress and follow up study of up to six months noted sustained progress.

Conclusion

Resourceful progress in emotional state was experienced by participants in brief duration. Statistically significant (p values <0.001) improvement was observed on scores of all three categories (Depression, Anxiety and Stress) of DASS along with improvement in wheel of life scale post therapy sessions. All these findings suggests that NLP Psychotherapy could be a viable option for people looking for sustained results for improving emotional state in lesser time.

However, it should be noted that NLP Psychotherapy is more dependent on how a technique is performed rather than which technique is used and success of therapy is greatly dependent on client- therapist rapport like in all therapeutic processes.

This pilot study shows positive findings and there is scope for further research. Author sees this study as an important addition to the limited database of NLP psychotherapy. This pilot study could be seen as an evidence based study which is supported by statistical analysis, subjective experiential changes and few months follow up of resourceful changes attained.

Author acknowledges that this study would have been better if sample size was larger with control study. This study reports preliminary results from an ongoing lateral study and further resources would be added in future.

References

[1.] Ashby, W. (1965) An Introduction to Cybernetics. Methuen: London.
[2.] Ashok, S. and Santhakumar, A. R. (2002) NLP to promote TQM for effective implementation of ISO 9000. *Managerial Auditing Journal*, 17(5): 261-5.
[3.] Bandler, R. (1985) Using your Brain for a Change. Moab, Utah: Real People Press.
[4.] Bandler, R. and Grinder, J. (1975b) Patterns of the Hypnotic Techniques of Milton H. Erickson, M.D. Vol 1. Cupertino, California: Meta Publications.
[5.] Bandler, R. and Grinder, J. (1979) Frogs into Princes: Neuro-linguistic Programming. Moab, Utah: Real People Press.
[6.] Bandler, R. and MacDonald, W. (1988) An Insider's Guide to Sub-Modalities. Cupertino, California: Meta Publications.
[7.] Barnett, E. A. (1990) The contribution and influence of neurolinguistic programming on analytical hypnotherapy. *Australian Journal of Clinical Hypnotherapy and Hypnosis* 11(1): 1-14.
[8.] Bateson, G. (1972) Steps to an Ecology of Mind. London: Paladin/Granada.
[9.] Bolstad, R. (2002) Resolve: A new model of therapy. Crown House Publishing Ltd.
[10.] Craft, A. (2001) Neuro-linguistic Programming and learning theory. *The Curriculum Journal* 12(1): 125-36. NLP
[11.] Field, E. S. (1990) Neurolinguistic programming as an adjunct to other psychotherapeutic/hypnotherapeutic interventions. American Journal of Clinical Hypnosis 32(3): 174-82.
[12.] Georges D.P. (1996) Improved employee selection and staffing through meta programmes. Career Development International 1(5): 5-9.
[13.] Geronilla, L. (1989) Neuro-linguistic programming compared to reality therapy. Journal of Reality Therapy 9(1): 13-19.
[14.] Gray R M, Liotta R F: PTSD: Extinction, Reconsolidation, and the Visual-Kinesthetic Dissociation Protocol. Traumatology 18(2) - SAGE journals: 3–16, 2012.
[15.] Grinder, J. and Elgin, S. (1973) A Guide to Transformational Grammar. New York: Holt,
[16.] Grinder, J., DeLozier, J. and Bandler, R. (1977) Patterns of the Hypnotic Techniques of Milton H. Erickson, M.D. Vol II. Capitola, California: Meta Publications.
[17.] Jupp, J. J. (1989) Neurolinguistic programming: an experimental test of the effectiveness of "leading" in hypnotic inductions. British Journal of Experimental and Clinical Hypnosis 6(2): 91-7.
[18.] Lee, A. (1993) Outdoor education and Neuro-linguistic Programming. Journal of Adventure Education and Outdoor Leadership 10(4):16-17.
[19.] McWhirter, J. (1992) Sensory Systems Training Manual. Glasgow: Sensory Systems. NLP
[20.] Perls, F. (1969) Gestalt Therapy Verbatim. Moab, Utah: Real People Press.
[21.] Rogers, C.R. (1961) On Becoming a Person. London: Constable.
[22.] Sandhu, D. S. (1994) Suggestopedia and Neurolinguistic Programming: introduction to whole brain teaching and psychotherapy. Journal of Accelerative Learning and Teaching 19(3): 241-56.
[23.] Stanton, H. E. (1994) Suggestology and NLP: are there similarities?. Journal of Accelerative Learning and Teaching 19(3): 241-56.
[24.] Tabrizi F, Shafiabadi A, Zahrakar K. (2015) Investigation the effectiveness of assertiveness training using neuro-linguistic strategies (NLP) to reduce anger among married women. New York Science Journal 2015;8(1):64-72.
[25.] Thompson J.E., Courtney, L. and Dickson, D. (2002) The effect of neurolinguistic programming on organizational and individual performance: a case study. Journal of European Industrial Training 26(6): 292-8.
[26.] Tosey P. and Mathison J. (2003) Neuro-linguistic programming and learning theory: a response. The curriculum Journal Vol. 14 No. 3 Autumn 2003 pp 371- 388
[27.] Trickey, K. V. (1997) How information gathering works for the librarian or the personal development coach. Journal of Managerial Psychology 12(5): 352-6.
[28.] Wake L, Leighton M: Pilot study using Neurolinguistic Programming (NLP) in post-combat PTSD Mental Health Review Journal 19(4): 251-264, 2014.
[29.] Watzlawick, P., Beavin, J.H. and Jackson, D.D. (1967) Pragmatics of Human Communication. New York: Norton.

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The Relationship between Job Satisfaction and Turnover Intentions among Graduate Teachers a Case Study of Graduate Teachers in Koforidua, Ghana

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Abstract

The reason why graduate teachers decide to quite their job is difficult to tell because of the complexity of turnover decision processes involving a large number of variables. This study therefore, aims at assessing how relative weights of teacher's satisfaction with salary, working conditions, and professional training experiences on job satisfaction affects turnover intentions, and actual turnover. One hundred graduate teachers made up of fifty males and fifty females were purposively sampled for the study. Data was gathered by administering a questionnaire which consists of three standardized scales, job satisfaction, turnover intentions, and perception of work environment. These scales elicited information on job satisfaction and turnover intention of the selected participants in addition to demographic data which elicited information on age, marital status, number of years in teaching among others. Findings revealed that work environment had no influence on job satisfaction and turnover intentions whiles job satisfaction correlates negatively with turnover intentions. Male participants expressed higher turnover intention than their female counterparts. It was also found that, number of years of service (tenure) has minimal influence on teachers' intentions to leave. It was concluded that in order to reduce turnover intentions among graduate teachers in order to resolve constant shortage of graduate teaching personnel, a lot more is needed to be done on job satisfaction among teachers.

Introduction

A number of models have been developed and tested to explain teachers' turnover behavior. The theories considered for the purpose of this research is the human capital theory and

Herzberg's (1968) dual-factor job satisfaction theory. The Human Capital Theory of occupational choice provides a conceptual framework for an understanding of some underlying factors that may contribute to an individual's decision to become a teacher, and subsequently, to remain in or leave teaching. (Becker, 1993; Ehrenberg & Smith, 2003). It considers factors like monetary benefit, non-monetary benefits and professional training benefits. Herzberg's (1968) dual-factor job satisfaction theory suggests that there are two dimensions of job satisfaction: motivation and hygiene factors. Human capital theory provides a useful framework for understanding some underlying factors that may contribute to an individual's decision to become a teacher, and subsequently, to remain in or leave teaching. Generally speaking, human capital theory identifies a turnover decision on the basis of the real or perceived value of the job in relation to the investment an individual has made to become a teacher (Becker, 1993; Ehrenberg & Smith, 2003). One of the major principles of human capital theory is that the greater the amount of knowledge and skills accumulated in a job over time from investments in education and job training, the lower one's probability of turnover from that occupation (Ehrenberg & Smith, 2003; Kirby & Grissmer, 1993). Focusing on the costs and benefits, if the present value of the benefits associated with turnover exceeds the costs, people will make a decision to change. In other words, teachers who foregone rewards (i. e., opportunity costs of teaching)outweigh the rewards gained from teaching will be more likely to leave the teaching profession. This theory

basically illustrates the relationships among education and training, migration and the search for a new job in terms of investment and its returns (Becker, 1993; Ehrenberg & Smith, 2003). Expected utilities from turnover decisions are influenced by entry requirements (e. g., licensure), and future benefits such as better salary (monetary rewards), working conditions (non-pecuniary attribute), and professional training benefits. If the present value of the benefits associated with turnover exceeds the costs, individuals are more likely to make a decision to change jobs.

Monetary benefits

From the perspective of Human Capital Theory, monetary benefits (e. g., health/life insurance, pensions)from the teaching profession can be viewed as returns on investment in education and training. Such training may make individuals more productive, resulting in higher wages and the trade-offs associated with the costs (Becker, 1993). Generally speaking, if teachers feel that their return is being lowered as they work, they will be less likely to invest in training and thus leave. In other words, teachers who have perceived that they have put too much into teaching but have not gotten enough in return decide to leave (Becker, 1993).

Non-monetary benefits

Along with monetary benefits, teachers consider non-monetary benefits as one of the most important factors affecting their career decisions. In general, non-monetary benefits may include support from fellow teachers and administrators, the quality of school facilities and resources available, autonomy in classroom, participation in school decision-making, student learning attitudes, and assigned teaching hours generally considered as working conditions (Barro, 1992; Ingersoll, 2001). Scholars differentiate between firm-specific and generic human capital. Firm-specific human capital refers to factors that cannot be transferred to other schools, while generic human capital is that which can be easily transferred to other schools and professions. Firm specific human capital includes knowledge of school practices, seniority in the system, respect of colleagues, and other forms of autonomy and privilege (Becker, 1993; Black, 1997; Grissmer & Kirby, 1987). In principle, the more firm-specific human capital that is built up, the less likely an individual is to leave that profession if the human capital is rewarded (Kirby & Grissmer, 1993). Most researchers generally agree that working conditions and/or school level characteristics contribute significantly to teachers' decisions about where to work, along with monetary benefits (Ingersoll, 2001 ; Mont & Rees, 1996; Theo bald & Gritz, 1996). Compared to monetary benefits, working conditions have received less attention in earner literature (Barro, 1992; Ingersoll, 2001).

Professional training benefits

Individuals increase their store of human capital through formal schooling and on-the job training which includes induction/mentoring programs and professional development programs. Training as investment in human capital can be labeled as general or specific. General training that accumulates generic human capital can be defined as any training that can be easily transferred to other professions and can increase an individual's future wages or benefits (Kirby & Grissmer, 1993). In contrast, specific training that builds up firm-specific human capital can be defined as training which is specific to the school in which a teacher teaches or another school in the district (Kirby & Grissmer, 1993). Human capital theory conceptualizes decisions individuals make to stay in or leave teaching as rational and based on the real or perceived value of the job versus the investment made to become a teacher.

Dual-factor job satisfaction theory

Various theorists have proposed models that map out the various sources of satisfaction and dissatisfaction for job satisfaction in general and for teacher satisfaction in particular. The essential underlying conceptual difficulty associated with researching job satisfaction is that there is no agreed upon definition of the term. Often cited in education literature, Herzberg's (1968)Dual-Factor Job satisfaction theory suggests that there are two dimensions of job satisfaction: motivation and hygiene. The motivator or intrinsic rewards includes recognition, achievement, possibility of growth, advancement, responsibility, and work itself (Hirsch, 2001). Motivator factors cause positive job attitudes because they satisfy the worker's need for self-actualization, an individual's ultimate goal (Judge, Bono, & Locke, 2000). Many enter teaching because they want to make a difference with children by successfully meeting their academic needs (Farkas, Johnson, & Foleno, 2000). Therefore, teachers are satisfied according to this view, when they can facilitate learning and cultivate positive relationships with students. The hygiene or extrinsic dimension is similar to that explained by human capital theory. This dimension includes salary, supervision, administrative policies, working conditions, and interpersonal relations (Herzberg, 1968).

Statement of the problem

Some schools in Ghana were facing a critical demand for new teachers at the turn of the century (Ghana National Education Campaign Coalition, 2006). Many researchers and educators have identified the key source of this challenge as the high rate of teacher turnover. However, it appeared there was no consensus in the literature around the factors that affected teachers' turnover decisions, and furthermore, what factors were more or less important to those decisions. It is important for policy makers and educators to understand the relationships among job satisfaction, intent to leave, and actual turnover. This will provide a better understanding of the complicated turnover process and allow for more accurate prediction of whether dissatisfied teachers or teachers with high level of turnover intention actually left teaching. There are two major universities that are mandated to train graduate teachers in Ghana; University of Education Winneba and University of Cape Coast. Students from other universities are also recruited in the teaching service. Apart from that there are thirty-eight teacher training colleges that train teachers. There are also few private training colleges in Ghana. Despite the large turnout in the universities mandated to train graduate teacher, there is still the issue of high turnover leading to high teacher student ratio (in excess of the standard ratio of 1: 15). For instance for the 2008/9 academic year, the University of Cape Coast turned out 3, 766 although not all the graduates were teachers whilst 3, 153 graduated from the

University of Education. Currently, it is estimated that Ghana needed 24, 000 more teachers to augment its teaching capacity (Ghana National Education Campaign Coalition, 2006). Yet teachers are always not enough for the schools in the country. The question therefore is "What are the variables that contribute to teachers' satisfaction or dissatisfaction?"and indeed "what informs the decision of teachers to leave the noble profession? It is against this background and observation that this research was undertaking to find out how job satisfaction can be maximized to increase retention of graduate teachers in the development of teaching and learning in Ghana.

Statement of hypothesis

The following hypotheses were tested;

- Working environment will have a positive impact on teacher's job satisfaction.
- Job satisfaction will have a significant negative correlation on turnover intentions
- Working environment will have an inverse relationship with turnover intention.
- Males will have significantly high turnover intentions than females.

- Teachers who have been in the teaching profession for less than 5 years will have higher intentions of leaving the teaching profession than those who have spent 5 yrs and above.

Methodology

Research design

An institutional case study was used in this study to investigate the relationship between job satisfaction and turnover intentions among graduate teachers in both public and private Senior High schools in Koforidua.

Sampling size and sampling technique

A sample of 100 teachers, 50 males and 50 females were selected for the study. Stratified random sampling technique was used since each gender constituted a stratum whereby respondents were chosen from. Out of the 100 respondents, 60 were married, (30 were males and 30 were females). Those who were single were 36, (20 males and 16 females). Those who were widowed were only 2 and these were only females. Those who were divorced were also 2 and were only females. Out of the 100 respondents, 12 had been in the profession between 0 and 2 years (12. 0%), 30 between 3 and 5 years (30. 0%), 12 between 6 and 9 years (12. 0%), 12 between 10 and 12 years (12. 0%)and 34 have been in the profession for 13 years and above (34. 0%). Again out of the 100 respondents, 22 had served on a committee (22. 0%), 26 on 2 committees (26. 0%), 14 on 3 committees (14. 0%), 4 on 4 committees (4. 0), 5 on 4 committees, 30 had not served on any committee. Out of the 100 teachers, 38 stayed close to their schools (38. 0%)whiles 62 stayed far from their schools (62. 0%). Out of the 100, 52 participated in extra curricula activities (counseling "2", music "2", sports "38", housemistress "4", spiritual union "2", artist "2" studying "2")whiles 48 did not participate in any extra curricula activities. Out of the 100 respondents, 12 taught for at least an hour in a day (12. 0%), 24 for at least 2 hours (24. 0%), 22 for at least 3 hours (22. 0%), 30 for at least 4 hours (30. 0%), 12 for at least 6 hours (12. 0%)

Material

A 4-part standardized questionnaire was the main data collection instrument. Section A was on demographic data and this section elicited information on age, marital status, number of years of teaching among others.

Section B was an 18-item Job satisfaction scale developed by Brayfield and Rothe (1951)with a reliability coefficient of 0. 87. This section tapped information on teachers' job satisfaction. Examples of the job satisfaction items were, "Is your job like a hobby", "Is your job usually interesting enough to keep you from getting bored?", "Are you enthusiastic about your job?" The reliability coefficient of job satisfaction for this sample was 0. 8. It can then be explained that the scale to a higher extent tapped the information it purported to measure. In comparison with the original reliability coefficient (0. 87)it can be said that although there are differences it is not all that significant hence they are all reliable. It may be due to small sample size from this research. Section C was the 3-item turnover intention scale developed by O' Driscoli & Beehr (1994)with an estimated Cronbach Alpha coefficient of 0. 91. This section tested teachers' intentions to quit. Sample questions included, "Do thoughts about quitting the job cross your mind?", "Do you plan to look for a new job within the next 12 months?", "How likely is it that over the next year, you will actively look for a new job outside?"

The Cronbach's alpha of turnover intention for this sample was 0. 88. This can be explained that the scale to a higher extent tapped the information it purported to measure. In comparison with the original Cronbach's alpha for the sample (0. 91)it can be said that although there are differences it is not all that significant hence they are all reliable. This can be attributed to the

small sample size in this research. Section 0 was a 20-item scale measuring perception of work environment developed by Niehoff & Moorman (1993). The Cronbach's alpha for the sample was 0. 7. This section gathered information on teachers' perception of the working environment. Sample questions included; "Does your manager clarify decisions and provide additional information when requested?""Are job decisions applied consistently across all affected employees?"; "Are Employees allowed to challenge or appeal job decisions made by the manager?"The Cronbach's alpha of teachers' perception of work environment for this sample was 0.6. It can then be explained that the scale to a moderate extent tapped the information it purported to measure. In comparison with the original Cronbach's. alpha it can be said that there are differences and this can be attributed to the small sample size that participated in the current study.

Procedure

. An appointment was booked with prospective respondents; graduate teachers after permission were granted. The questionnaires were personally administered. To ensure availability of respondents at a time, questionnaires were administered when the school was on break during school hours. The questionnaires were collected two days after it had been administered.

Scoring

Responses on the job satisfaction questionnaire were scored on a 5-point Likert scale which ranged from: 'Strongly agree' for a score of 5, agree' for 4, undecided' for 3, disagree' for 2 and 'Strongly disagree' for 1. Responses on the turnover intentions questionnaire were scored on a 6-point response scale. Responses on the perception of work environment questionnaire was scored on a 5-point Likert type scale ranging from a 'very small extent' for a score of 1, to a 'small extent' for a score of 2, to 'a moderate extent 'for a score of 3, 'to a large extent' for a score of 4 and 'to a very large extent' for a score of 5.

Analysis

The Pearson Product Moment correlation was used to analyze the first three hypotheses. The independent T-test was used in analyzing the fourth hypothesis. The researcher used the Statistical Package for Social Sciences (SPSS)version 11 for the data analysis. All the questionnaires were entered and the answers coded.

Results

Working environment has a positive impact on teacher's job satisfaction.

One of the hypotheses is that; working environment will have a positive impact on teacher's job satisfaction. Table 1 gives the Pearson Correlation Results on Teachers' Working Environment and Job satisfaction.

Table 1. Pearson' Correlation Results on Teachers' Working Environment and Job Satisfaction.

Variables	Mean	Std. Deviation	df	obs	
Working Environment	62.26	12.21	98	−006	0.48
Job Satisfactory	50.68	7.39			

Sig. (l-tailed)

Table 1 shows that there is a negative correlation [r (98)= -0.006, p= n. s] between working environment [Mean = 62.26, SO=12. 21] and job satisfaction [Mean=50. 68, SO=7. 39]. The hypothesis which states that; working environment will have a positive impact on teacher's job satisfaction is not supported by the data gathered.

Relationship between job satisfaction and teacher turnover intentions.

The study was interested in knowing the extent to which teachers are satisfied with their job and the implication job satisfaction has on their intentions to continue or stop teaching. Table 2 below displays Pearson Correlation results on teachers' job satisfaction and turnover intentions.

Table 2. Pearson's Correlation Results on Teachers' Job Satisfaction and Turnover Intentions.

Variables	Mean	Std. Deviation	Df	Robs	*p*
Job Satisfactory	50.68	7.39	98	−276	0.05
Turnover intentions	9. 80	4. 66			

Sig. (l-tailed)

The results shows a negative correlation [r(98)= -0. 276, p<0. 05] between job satisfaction [Mean=50. 68, SD=7. 39] and turnover intention [Mean=9. 80, SD=4. 66]. The result supports the hypothesis which stated that "Job satisfaction will have a significantly negative correlation on turnover intentions".

Relationship between working environment and turnover intentions

Table 3. shows Pearson' Correlation Results on Teachers' Working Environment and turnover intentions.

Variables	Mean	Std. Deviation	Df	Robs	*p*
Job Satisfactory	62.26	12.21	98	−.015	0.44
Turnover intentions	9. 80	4. 66			

Sig. (l-tailed)

Table 3 reveals that there is an inverse relationship between [r(98)= -0. 15, p= n. s] working environment [Mean=62. 26, SD= 12. 21] and turnover intentions [Mean=9. 80, SD=4. 66]. The hypothesis which stated that there will be an inverse relationship between working environment and turnover intentions was not supported by the data gathered.

Males will have significantly highly turnover intentions than females

Table 4. Independent t- Test Results on Teacher Turnover Intention by Gender

Variable	**Male**		**Female**		**df**	**t obs**	**p**
	M	**SD**	**M**	**SD**			
Turnover Intention	67. 2451	0. 3424	46. 2641	2. 2536	98	4. 545	0. 001

To test for the difference in Turnover Intentions between male and female teachers, an independent t -test was conducted on the data gathered. The results in table 4 show that male teachers [M =67. 2451, SD=0. 3424] and female teachers [M =46. 2641, SD=2. 2536] have significant difference in Turnover Intentions [t (98)=4. 545, p<0. 05]. Male teachers recorded a higher turnover intention mean score (67. 25)compare to that of female teachers (46. 26).

Meanwhile, the higher the mean, the greater the turnover intention. This means that the data gathered supports the hypothesis that males will have higher intention of leaving the teaching field than females.

Years in Teaching profession and intentions to quit

The fifth hypothesis was that Teachers who have been in the teaching profession between 1 –

Table 5. Independent t- Test Results on Years in teaching profession and intentions to quit.

Variable	Between 1-5 yrs in teaching M	SD	5 yrs and above in teaching M	SD	df	t obs	p
Turnover Intention	4.20	2.39	4.20	3.82	98	0.00	0.422

5 yrs will have higher intentions of leaving the teaching profession than those who have spent 5 yrs and above.

In table 5, at an alpha 0. 05, it is seen that the difference between teachers who have spent between 1-5 yrs [M =4. 2, SD=2. 39] and Teachers who have spent 5 yrs and above [M =4. 2, SD=3. 82] is not significant [t((98)=0. 00, p= n. s]. The hypothesis which states that "Teachers who have been in the teaching profession between 1 -5 yrs will have higher intentions of leaving the teaching profession than those who have spent 5 yrs and above was not supported by the data gathered.

Discussion

Working environment as a factor of job satisfaction.

Locke and Lathan (1976)gave a comprehensive definition of job satisfaction as pleasurable or positive emotional state resulting from the appraisal of one's job or job experience. Locke and Lathan clarified that employees become satisfied if their working conditions; thus, autonomy, training and salary meet their personal demands. Comparative to this study, the data gathered on graduate teachers confirmed the hypothesis which stated that "there will be a negative relationship between working environment and job satisfaction". Practically, teachers see the satisfactory nature of their job from the kind of. teaching environment they find themselves in. This means that the more they perceive their working environment as not satisfactory the less they become satisfied. Job satisfaction has been defined in several ways but its materialization has always raised many questions. From the perspective of human capital theory, monetary benefits (e. g., health/life Insurance, pensions)from the teaching profession can be viewed as returns on investment in education and training. Such training intuitively makes individuals more productive, resulting in higher wages and the trade-offs associated with the costs (Becker, 1993). The analysis revealed that a greater number of the teachers 34% disagreed that they have satisfaction for the teaching job, as a reason, most of them 44% saw their working conditions to be very poor. According to the teachers, their working conditions do not truly reward them on the great impact they make on the society, specifically, the education given by them to students.

The kind of relationship between job satisfaction and teacher turnover intentions.

Dias-Serrano (2005)stated that Job satisfaction is considered a strong predictor of overall individual well being as well as a good predictor of intentions of decision of employees to leave a job. The issue of job satisfaction is of considerable importance to both employers and employees. The employer benefits from satisfied employees as they are more likely to profit from lower staff turnover intention which leads to actual turnovers. In the analysis from this study, it is established that there is a significantly negative relationship between job satisfaction and turnover intentions, explaining that if employees are not satisfied with their jobs they will be tempted to leave. On the contrary, they will stay if they are satisfied with their job. The implication is that graduate

teachers saw their superiors to be unfair; they saw the Education Service as a weak body to create advocacy platform for teachers. According to Alexander (1998), turnover intentions are a direct predictor of real turnover and have a negative effect on job performance and productivity. Today, few people would disagree that the teacher is the most influential school related factor affecting the quality of education a student receives (Darling- Hammond, 1999; Sanders & Rivers, 1996). Some researchers argue that dissatisfied teachers are less likely to do their best work in the classroom Evans, (2001). The findings obtained in this confirmed that of Evans, because teachers were not satisfied with their job, they felt reluctant, bored and unhappy to go to school, left alone for them to even teach. Quality teaching of these Teachers was questionable. They taught their students without any motivational interest. The poor situation either made teachers to be sacked by their superiors or to quit teaching voluntarily, consequently resulting in high teacher turnover. Nevertheless teachers who could not perform had threats of being sacked. Thus, although teacher turnover provides some positive outcomes Macdonald, (1999), such as the loss of incompetent teachers it can also contribute to distributional inequity of the quality of education service in some critical subjects like mathematics and science and regions (e. g., urban or rural areas). Furthermore, teacher turnover produces costs and disruption associated with recruiting, hiring and induction efforts (Boe, 1997).

Working environment as a factor of turnover intentions.

According to Mobbley (1982), extrinsic sources of satisfaction are situational and depend on the environment such as pay, promotion or job security: these are financial and other material rewards of a job. This aspect of job satisfaction is related to turnover intentions. The analysis of the data gathered suggested that there was a negative relationship between working environment and job satisfaction, meaning, teachers' working environment was dependent on turnover intentions. The results obtained in this study strongly agreed with Hanushek, et al. (1999) who stated that overall, higher salary is associated with lower teacher attrition, but the effect of salary is small and varies within characteristics of subpopulations. For example, using several logistic regression equation models, Hanushek, et al. (1999) found that salary increases reduced the likelihood that teachers in Texas would leave their district, yet teacher mobility was much more strongly related to characteristics of the students than to salary. The main finding was that, teachers who were part of the study were not satisfied with their job as a result of the unfavorable working environment they found themselves in. The poor nature of the working environment and absence of motivation such as recognition, financial incentives and equity made teachers had intentions of quitting the teaching career.

Teacher characteristics associated with turnover intentions.

The result shows that male teachers and female teachers have significant difference in turnover intentions. Thus, the data gathered supported the hypothesis that; males have more intentions of leaving the teaching field than females. The difference in turnover intentions can partly be attributed to the high level of commitment demonstrated by women in their organization.

The fifth hypothesis which stated that teachers who have spent less than five years in the teaching profession were less likely to leave the profession in comparison to teachers who have spent more than five years was not supported by the data gathered. The findings obtained rather confirmed that teachers who had spent more than five years in the profession had intention of quitting the career; unfortunately these teachers were those who were of age 40-44 years. This contradiction in the findings can be attributed to cultural variations as well as individual differences. It can also be attributed to boredom, i. e. these teachers have been performing the same task for a longer time. This is a determinant of job satisfaction which can lead to higher intention of quitting the teaching profession. The growing demand for teachers is not simply caused by large increases in student enrollments and in teacher retirements, class size reduction,

and insufficient production college graduates from teacher education programs another key source of this challenge lies in the high rate of teacher turnover (Grissmer, et al., 1997)

Summary and Conclusion

The study investigated the relationship between teachers' job satisfaction and turnover intentions. The hypothesis which stated' that; there will be a positive relationship between working environment and job satisfaction was not supported by the data gathered. Alternatively, the analysis suggested that there was a negative relationship between working environment and job satisfaction, meaning, teachers considered their job satisfactory as dependent variable on working environment. The main finding was that, teachers were not satisfied with their job as a result of the unfavorable working environment they found themselves in. The data supported the hypothesis which stated that job satisfaction will have a significant negative correlation on turnover intentions. The results showed that, teachers who were satisfied with their profession did not have the intention of quitting but those who were not satisfied had the intention of quitting the teaching job. The hypothesis which stated that working environment will be inversely related to turnover intention was not supported by the data gathered. Alternatively, the decision was that only when teachers were not satisfied with their working environment to some extent before thoughts of quitting the teaching profession crossed their minds. Furthermore, teachers will endure their poor working environment only to some level and then think of leaving the profession entirely. An independent t-test was conducted on the data gathered using Statistical Package for the Social Sciences (SPSS) software. The data gathered supported the hypothesis that; males have greater intentions of leaving the teaching field than females. The hypothesis which stated that teachers who have been in the teaching profession between 1 -5 years will have higher intentions of leaving the teaching profession than those who have spent 5 years and above was not supported by the data gathered. It is clear from the study that job satisfaction and turnover intentions are negatively correlated and therefore paramount to pay close attention to the study of job satisfaction among the teachers to sustain effective teaching and learning in schools.

Recommendations

It was found in the study that teachers who have been in the teaching profession for a relatively longer time had higher intentions of quitting; hence it is recommended that incentive packages should be given to teachers who have been in the profession for a relatively longer time as a motivating factor to ensure retention. The duration for the research should be extended to ensure effective, efficient and extensive work. It is therefore paramount to pay close attention to the study of job satisfaction among teachers to sustain effective teaching and learning in schools.

References

[1.] Baker, D., & Smith, T. (1997). Teacher turnover and teacher quality: Refocusing the *Teachers College Record,* 99(1), 29-35.

[2.] Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special Reference to education* (3rd ed.). Chicago: University of Chicago Press.

[3.] Brewer, D. (1996). Career paths and quit decisions: Evidence from teaching. *Journal of*

[4.] Darling-Hammond, L. (1999). *Solving the dilemmas of teacher supply, demand, and standards: How we can ensure a competent, caring, and qualified teacher for every child.* New York, NY: National Commission on Teaching & America's Future.

[5.] Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives, 8(1).*

[6.] Ehrenberg, R. G., & Smith, R. S. (2003). Modern labor economics: Theory and public policy (8th. ed.). New York, NY : Addison Wesley Longman, Inc.

[7.] Evans, L. (2001). Delving deeper into morale, job satisfaction and motivation among education professionals: Re-examining' the leadership dimension. *Educational Management Administration,* 29, 291 - 306.
[8.] Grissmer, D. W., & Kirby, S. N. (1997). Teacher turnover' and teacher quality. *Teachers College Record,* 99(1), 45-56.
[9.] Hanushek, E. A., Kain, 1. F., & Rivkin, S. G. (1999). *Do higher salaries buy better teachers?* (Working Paper No. 7082).Cambridge, M A: National Bureau of Economic Research.
[10.] Herzberg, F. (1968). *Work and the nature of man.* London: Staple Press.
[11.] Ingersoll, R. M. (2001). *Teacher turnover, teacher shortages, and the organization of schools*
[12.] Ingersoll, R. M. (2003a). ls *there really a teacher shortage?* Seattle, W A: Center for the (No. Document R-01 -1). Seattle, W A: University of Washington, Center for the Study of Teaching and Policy. Study of Teaching and Policy.
[13.] Judge, T. A., Bono, J. E., & Locke, E. A. (2000). Personality and job satisfaction: The mediating role of job characteristics. *Journal of Applied Psychology,* 85(2), 237-249.
[14.] Kirby, S. N., & Grissmer, D. W. (1993). *Teacher attrition: Theory, evidence, and suggested policy options.* Santa Monica, CA: RAND
[15.] Macdonald, D. (1999). Teacher attrition: a review of literature. *Teaching and Teacher Education,* 15(8), 835-848
[16.] Niehoff, B. P. & Moorman, R. H. (1993). Justice as a mediator of the relationship between methods of monitoring and organizational citizenship behavior. Academy of Management Journal, 36, 527-556.
[17.] Vandenberg, R. 1., & Nelson, J. B. (1999). Disaggregating the motives underlying turnover intentions: When do intentions predict turnover behavior? Human Relations, 52(10), 1313-1336.

Reduction of Type-A Behavior among Industrial Workers with the Application of Behavior Technology

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Abstract

This study attempts to reduce the Type-A Behavior among Industrial Workers. Many studies have examined the Health Effects of Type-A Behavior and Job Satisfaction etc. The Personality Types of individuals have been determined by many Theories and Models, e. g. the Myers-Briggs Type Indicator (Briggs Myers and Hauley McCauley, 1985), The Big Five Model (Costa and McCrae, 1993), Psychoticism, Extraversion and Neuroticism – PEN Model (Eysenck, 1947).

The above models assume that Personality Factor has been crystallized over a period of time due to prolonged Habituation. Hence it is generally believed that Personality will remain constant. But the present study tried to explore the possibility of changing the Personality by Deliberate Self-Effort and concomitant Behavior Change. The following Behavior Technologies were administered on the sample of Industrial workers (N=51).

1. *Anger Relaxation Technique*
2. *Reduction of Breathing Rate*
3. *Ashwini Mudra Technique*
4. *Simplified Kundalini Yoga*
5. *Mahapran Dhvani*
6. *Laughter Technique*
7. *Creativity/Problem Solving Skill*

The purpose of this study is to bring about a Behavioral Change in Type-A Behavior of the Industrial Workers. A deliberate attempt by the Respondents of this study could help them to develop Type – B Behavior and hence reduce their Type - A Behavior. The results of this study have shown that Behavior Change is possible by administering a few Behavior Technology Interventions to the respondents and by their regular Practice of the techniques.

Key Words: *Type-A Behavior, Industrial Workers, Behaviour Technology, Intervention techniques.*

Type-A Behavior is characterized by Impatience, a Chronic Sense of Time Urgency, Enhanced Competitiveness, Aggressive Behavior and often some Hostility, Where as Type-B Behavior lacks these Type-A Characteristics. Workers with Type-A Behavior have shown more Work-Stress than Type-B Workers. Type-A Workers report more Psychological Complaints, higher levels of Workload, higher Blood Pressure and higher level of Stressful Events. They run a high risk for Premature Heart Disease. (Cottington, E. , et al. , 1983). Type-A Behavior has Potential Risk Factor for Heart Disease. (Friedman, M. 1950). After a long study it is found that healthy men between the ages of 35 and 59 run the risk of Coronary Heart Diseases (Friedman and Rosenman, 1959).

Type-A persons view their Working Environment and perceive their Mental and Physical Status differently than the Type-B Persons. Personality has been considered as a Trait, which is enduring in Nature. But the Present Study has attempted to treat Personality as ‘Dynamic’ and hence amenable for ‘Change’ by the individual, deliberately shifting Type-A Behavior Workers to Type-B Behavior.

Type-A Workers had at least one artery with a clinically significant occlusion of 75% or greater. The finding of the Research Study by Redford (1980) suggests that the interventions reduce the contribution of Behavioral Patterns to Coronary Disease Risk and assist in the Reduction of Anger and Hostility.

Aims of the present study

1. To measure the Type-A Behavior among the Industrial Workers.
2. To administer Brief-Behaviour-Technologies for reducing the Type-A Behavior of the Industrial Workers.
3. To evaluate the Efficiency of the Behaviour -Technology Intervention Techniques in the overall Reduction of the Type-A Behavior.

Method:

Sample:

A sample consisted of 51 workers from a large Automobile Ancillary Parts Manufacturing Industry in Coimbatore. In order to reduce their Type-A Behavior, Interventions Techniques of Behaviour Technology were administered on the Workers for 60 minutes a day for six weeks.

Measures:

Type-A and Type-B Questionnaire - (Cooper and Davidson, 1980)was given to the respondents, 'Before' and 'After' after administering the Behavior Technology Interventions and the test results were analyzed, tabulated and graphically represented.

Behaviour Technologies Administered:

1. 1 . Anger Relaxation Technique (Ganesan, 1980)
2. Reduction of Breathing Rate (Ganesan, 1990 a)
3. Ashwini Mudra Technique (Vethathiri Maharishi, 1972 a)
4. Simplified Kundalini Yoga (Vethathiri Maharishi, 1972 b)
5. Maha Prana Dhvani (Acharya Mahaprajna, 1975)
6. Laughter Technique (Ganesan, 1990 b)
7. Creativity/Problem Solving Skill (Ganesan, 1985)

1. **Anger Relaxation Technique** is a very effective Technique for Controlling or Reversing the Anger. Aggressive or Anger Behaviour has been posing a great threat to the development of the Individual. This technique consists of a particular Breathing Pattern and Skeleto-Muscular Reactions elicited with the Expression of the Emotion of Anger. When this technique is rehearsed in a controlled manner; it could help gaining Voluntary Control over the Emotion of Anger. (Ganesan, 1980).

2. **Reduction of Breathing Rate** is an effective way to reduce one's Tension and Depression. The normal rate of one's breathing is from 15 to 20 sets per minute. By this Behaviour Technology Intervention one can reduce the Breathing Rate down up to 3 or even to 1 per minute. Lower the Breathing Rate, better it is. This is done in sitting position with the back straight, the neck and head in a vertical line. The total number of Exhalations and Inhalations are counted for one minute and it is divided by 2, which would give the Rate of Breathing per Minute of that Individual.

After doing this Breathing Technique for one minute, one should relax for a minute, then repeat the same procedure and count the Number of Breaths again, this time, trying to breathe more slowly. Thus 10 such Counts shall be recorded and the final value would be lower than the first value. This Technique may be repeated two or three times a day for a better effect. (Ganesan, 1990 a)

3. **Ashwini Mudra Technique** is another Behaviour Technique Intervention by Vethathiri Maharishi (1972)and is very effective for enhancing one's Emotional Intelligence. Ashwini means Horse and Mudra means a Symbol or Posture. The Horse is very fast, dynamic and its skin is always smooth and doesn't wrinkle. When it passes its excreta, it repeatedly squeezes its anal muscles tightly and then releases. Ashwini Mudra was named because the action of anal muscle movement, and muscle contraction resembles that of a horse with its anal sphincter, immediately after evacuation of its bowels. It helps in increasing the sperm count and quality and helps to retain the youthfulness longer. The Ashwini Mudra Technique when practiced regularly removes laziness and tiredness and brings in vitality and good memory.

This Mudra involves the contraction and relaxation of the Sphincter muscles in the Perineum and the entire Pelvic Region. This can be practiced by pregnant women also to facilitate a smooth and natural delivery of child. Since all the nerves end at the anus, this Mudra action triggers all the nerves and rejuvenates the whole body and the brain, enabling a better Emotional Health.

4. **Simplified Kundalini Yoga** by Maharishi Vethathiri (1972) is yet another important Behaviour Technology Intervention. This arouses the Kundalini Power from Mooladhara to the center of the eye brows, called Agna Chakra. This Enables the Respondent to feel the existence and function of the mystic Kundalini Power that gives greater awareness of the Divine and continuous flow of Happiness and Joy. This also contributes to the enhancement of Emotional Intelligence and improves Memory. This is done by sitting straight, closing the Eyes and Concentrating on the Midpoint of both the Eye Brows, called the Agna Chakra, for 10 to 15 minutes. This shall be done at least two times a day on empty stomach.

5. **Maha Prana Dwani** by Acharya Mahaprajna (1975)is an unique Meditation used as another Behaviour Technology Intervention Technique that can be used to quieten the Mind, reducing the Mental Frequency from Beta Waves (14 to 40 Cycles per second)to Alpha Waves (8 to 13 Cycles per Second) and thereby helping to improve one's Emotional Intelligence. This is done by sitting straight; closing the eyes, taking a long Inhalation. Then chant "Imm… "(Closing the Mouth), as long as possible. Again repeat the same procedure with long Inhalations and Chant "Imm… ", for ten minutes; then one shall lie down and relax

for 15 minutes. This may be done twice a day Morning and Evening.

6. Laughter Technique by Ganesan (1990)is a very useful Behaviour Technology Intervention Technique that brings many positive results on the Respondent who practices this Intervention regularly. Laughter brings lot of Psycho, Neuro and Endocrinological Changes in the Body. It increases the Oxygen Intake, strengthens the Lung Muscles and relaxes the Body. Laughter has been proven to be an instant Stress Reliever. Laughter has become a smarter way to relax, to beat the Stress, Tension and Depression. The Emotional Intelligence increases in a person on regular practice.

This Laughter Technique is done in lying position on a mat, taking a long Breath and repeating the five Main Alphabets of Tamil Language viz. , Aa as H haa…, Ee as H hee…, U u as H huu…, Ae as Hhae…, and Oo as H hoo…. Take one alphabet at a time and it is repeated in quick succession a number of times as stated; H haa H haa H haa…; this ultimately becomes the laughter. Continue this laughter within the same breath so as to empty the lungs completely. End this by laughing out loudly and heartily.

7. **Creativity/ Problem Solving Skill** is one more Behaviour Technology Intervention Technique that can be practiced to trigger the Right Hemisphere of the Brain and activate it effectively. This is done by giving a problem to the respondents and asking them to write down different solutions to the problem. There shall normally be more than one solution to the problem. Every other solution shall be of different nature or from a different angle. This enables Lateral Thinking and engages the active function of the right Brain. The Creativity or the Problem Solving Skill also enhances one's Emotional Intelligence and reduces the Type - A Behavior.

Methodology

The Type-A/ Type-B Personality Behavior Questionnaire by Cooper and Davidson (1980) was given to the Respondents. This Questionnaire contains 13 statements under both the Type-A Behavior and Type-B Behavior Columns. In the middle of the Columns, the Questionnaire Scores (5, 4, 3, 2, 1 , 0, 1 , 2, 3, 4, 5)are given, the first five in the decreasing Order representing Type-A and the second five in the increasing Order representing Type-B Behaviors with 0 at the center. This 0 column shall be cancelled so that the Respondents shall not be tempted to mark this 0 for all Questions if they are not interested in answering the Questionnaire truthfully. The Respondents were asked to read the Statements and asked to circle the number which most closely represents the individual Respondent's nature. By summing up the score values separately, the total score of the Respondents under each type of Behavior is obtained.

This scale is designed to measure Type-A Behavior Pattern. Type-A Behavior includes Explosive, Accelerated Speech, Interrupting others, a Fast-P aced Approach to Life, Impatience in Waiting, Doing M ore Activities at Once, Dissatisfaction with Life and Free Floating Hostility (Matthews, 1982). Type-A Behavior Pattern may be contrasted with Type-B Behavior Pattern, which is characterized by a Relaxed, Unhurried, Mellow, and Satisfied Style. But this doesn't mean the Type–B Workers are not motivated to achieve, they simply approach their goals in a slower, Less Aggressive and More Methodical Manner.

Along with this Intervention, Group Counseling and Guidance for their Personal Problems were also given to the Sample group of Workers for their Type-A Behavior Problems. The results showed that the Behaviour Technologies administered had significantly reduced the Type-A Behavior of the Workers.

Results and discussions

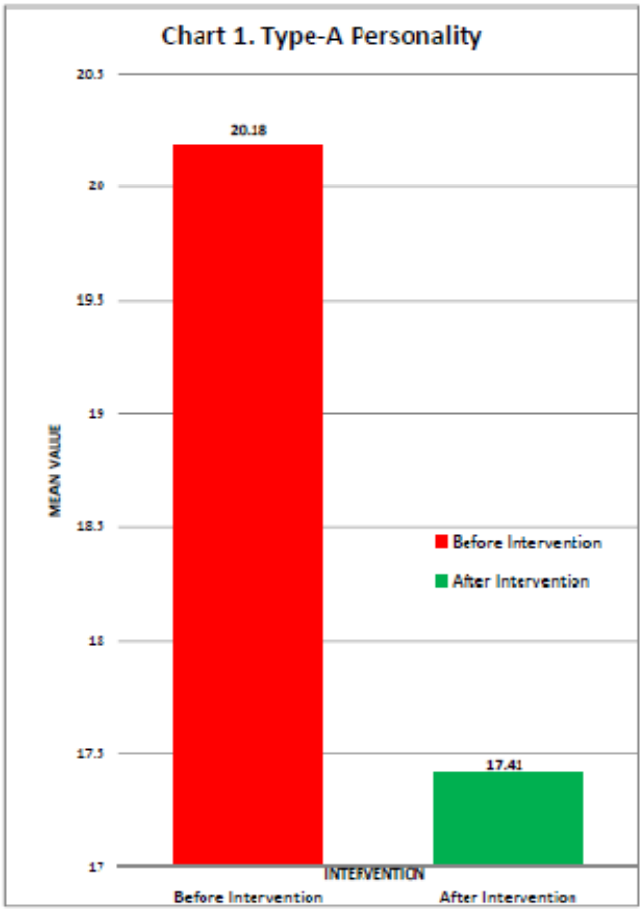
The "Before and After" Measurements of Type-A Behavior Trait Scores are presented in **Table-1** and the Bar Chart is presented in **Chart 1** below.

Table 1: Change of Type-A Behavior among Industrial Workers (N= 51)

Type-A Personality	Mean (SD)	Mean Difference	Critical Ratio
Before Intervention	**20. 18** (11 . 20)	**2. 77**	**1. 39****
After Intervention	**17. 41** (8. 91)		

**** p < 0. 05**

The findings in the Table 1 . Show that there is significant impact of the Behaviour Technologies in the Reduction of Type-A Behavior among the Industrial Workers.



The results presented in Table 1 and Chart 1 clearly show that in the "Before-After-Conditions", the Mean Value of the Type A Behavior Scores have significantly reduced from 20. 18 to 17. 41 and it is found to be **p < 0. 05.**

The result reported in this paper is a part of a larger study on Employee Counseling.

Conclusions

Administration of Behaviour Technology Intervention Techniques had significantly reduced the Type-A Behavior among the Industrial Workers enabling a Stress-Free Life with better Health and Emotional Behavior.

References

[1.] *A*charya Mahaprajna, (1975)*Preksha Dhyana Centre: Perception of Psychic Colours. Rajasthan: Jain Vishva Bharati.* (Mahaprana Dwani in Meditation)

[2.] Briggs, M. and McCauley, H. (1985). Myers-Briggs Type Indicator. *Sage Journals.*

[3.] Cooper, J. K. and Davidson, C. T . (1991). Type-A/Type-B Personality Tests. *Journal of Organizational Behavior*, 12 (2), 155-168.

[4.] Costa and McCrae. (1993). The Big Five Model.

[5.] Cottington, E, Matthews K, Talbott, E. and Kuller L. (1983). Occupational Stress and Blood Pressure in a Blue-Collar Population: *American Journal of Epidemiology* 118: 442.

[6.] Eysenck, H. J. (1947)PEN Model. *Journal of Personality and Social Psychology*. 69 (2), Aug 1995, 308-317.

[7.] Eysenck, H. J. (1967). *The biological basis of Personality*. *Springfield, IL*

[8.] Friedman, M. (1996). Type-A Behavior: Its Diagnosis and Treatment. New York, Plenum Press, pp. 31 ff. http://en.wikipedia.org/wiki/Type-AandType-Bpersonality theory.
[9.] Friedman and Rosenman. (1959). Type A Behavior Pattern; Some of its Pathophysiological Components. *Springer Journal of Urban Health*, 53(7), 593– 60
[10.] Friedman, M. et al. (1981). Feasibility of Altering Type-A Behavior Pattern after Myocardial Infarction. *American Heart Association Journals. Circulation* 1982; 66; 83-92.
[11.] Ganesan, V (1983). Knowledge Workers: Organizational Climate and Motivation. *Psychological Reports*. 52, 884-886.
[12.] Mc Givney, (2008). Evolution of the Influence of Personality Types on Performance of Shared T asks in a Collaborative. Ph. D. Dissertation submitted to Dublin City University.
[13.] Redford, W . B. et al. (1980). Type A Behavior, Hostility and Coronary Atherosclerosis. *Journal of Biobehavioral Medicine* 1980, 42, 6.
[14.] Vethathiri Maharishi (1972). Kayakalpa Practice, *Manavalakkalai.* Erode, India: *Vethathiri Pathippagam.*
[15.] Vethathiri Maharishi (1972). Manavalakkalai Vol. 1 . , Erode, India: *Vethathiri Pathippagam.*

Article Review of three case studies showing the common factors of burnout the school counselors come across in different interval period

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Sources

Falls, Leigh and Nichter, Mary (2007). "The voices of HS Counselors: Lived experience of job stress". Journal of School Counseling, v5 N13 2007. Retrieved on 7/22/2015; http://files.eric.ed.gov/fulltext/EJ901174

Windle, Michele Hurt (2009), "Counseling Matters: A multi-case study of High School counselors and their role in the school community". Retrieved on 07/22/2015; http://www.repository.lib.ncsu.edu/ir/bitstream/1840.16/5060/1/etd.pdf

Moyer, Michael (2011). "Effects of non-guidance activities, supervision, and student-tocounselor ratios on school counselor burnout". Journal of School Counseling, v9 N5 2011. Retrieved on 7/22/2015; http://jsc.montana.edu/articles/v9n5.pdf

Introduction

The article review discusses three studies that examine the factors lead to burnout which experienced by the school counselor in different time interval. In the Journal School of Counseling article " The voices of High School Counselors: lived experiences of job stress ", Leigh Falls and Mary Nichter (2007) suggested school counselors commonly experience situations of high demand and low control, due to the complex and diverse nature of the work they perform. In the NCSU libraries article, "Counseling Matters: a multi-case study of high school counselors and their role in the school community", as the findings of Michelle Hurt Windle (2009) suggested that high school counselors had experience an overloaded with noncounseling related duties and expected to serve far too many students. The results presented by Michael Moyer (2011) in the Journal of School Counseling article "Effects of nonguidance activities, supervision, and the ratios of student-to-counselor school counselor burnout, indicated that the greater amount of time spent on non-guidance duties, the greater it significantly affects school counselor burnout. Also, school counselors often experience of low self-efficacy due to lack of support, role ambiguity, role conflicts and workloads which caused burnout from the school counselors' profession. All of the article imply that several factors such as large caseloads, role ambiguity, non-guidance activities and lack of time spent on counseling duties lead to burnout. All of the article imply that several factors such as large caseloads, role ambiguity, non-guidance activities and lack of time spent on counseling duties lead to burnout. Most of the studies presented the same factors in different period that confirmed the causes of school counselor burnout. Each study has weakness that include bias, contradiction and limits of the study.

Objective of the article review

In this study the information was objective developed, well support with a current research based and with all evidence acknowledged and referenced. There is an evidence of bias. The article acknowledged the complexity of the issues discussed in a number of ways with reference to the three case studies. School counseling is a vocation in which emotional empathy is a prerequisite and the type or kind and number of job demands are high. Stressors associated to burnout have effects that may continue even after exposure to the stressor has ended, leading to

undesirable impact on well-being. The purpose of this article review is to reflect and recollect the different case studies that brought to light the issue of burnout that focused more on to the school counselor which still exist up to this date. The participants and the evaluation and findings were clearly defined.

Background

Two main keywords, burnout and school counselor, are discussed in this section. By definition extracted from Wikipedia about burnout where it is a psychological term that discusses to long-term exhaustion and reduced interest in work. Burnout had been assumed to result from continuing work-related stress such as work surplus. Burnout is becoming a more common results as the modern workplace changes. The increasingly intimidating and demanding environment in which employees work is being studied as a cause by both economically and psychologically exhaustion. More frequently, the economic values are much more considered than that of human values. The incident is more likely when a discrepancy is present between the nature of the job and the person doing the job. A common indication of this discrepancy is work overload. It involves doing too much with too few means, going beyond human boundaries. This may occur in a situation of reduction or downsizing, which often does not reduce company's mandate, but allocates it to present employees. Typical causes of burnout resulted directly from work, such as lack of recognition for good work, feeling of no control over one's work, and unclear and overly demanding expectation. Burnout may sound a lot like stress, it is important to realize that it is not the same characterization. Stress is categorized by over involvement, burnout is characterized by detachment. Stress ultimately produces determination and hyperactivity, whereas burnout produce helplessness and hopelessness. Although, stress my cause a loss of vigor and develops anxiety disorder, on the other hand burnout often involves loss of motivation, ideas, hope and aspiration.

School counselors is an essential part of any school organization in the elementary, middle and high school grade levels. They are supporters in the students' whole being because they direct guidance of both their own and school life. School counselors make regular assessments of the students' performance and improvement. This enables them to measure their individual requirements and every so often checking with students regarding their future career choices. The school counselor's role is a vital part of influencing the individuality of the students. Job responsibilities differ depending on the education level they are in. Generally, they are students' believers.

Summary of case studies

This section provides a quick glance of each study. All of the studies varied in the subjects and methods used. The first study illustrates the job stress phenomenon in the counselors' own views, identifier situation (role uncertainty, role struggle and work overload) contributing to job stress. After two years another study addresses issues of school counselors have in common, their job outlooks and how those issues contribute to their specialized self efficacy. The last study after another two years interval determined that guidance related duties and supervision are the best predictions of burnout.

In "The voice of high school counselors: live experience of job stress", conducted a qualitative study. Four high school counselors, 1 male and 3 female; 2 Caucasian and 2 African American, from two high schools were interviewed. The interview was an openended question in order to encourage the participants to describe what was significant and noteworthy to them in their own experiences of job related strain. Researcher triangulation was incorporated by having two researchers independently review and code the data. Job stress includes situations involving high external demands for principals, teachers, parents or students and low personal control regarding how their time is spent. Role uncertainty exists when the counselor's perception of his or her role

and that of external stakeholders are inconsistent. School counselors experience role conflict when they are expected to complete two or more tasks simultaneously, often lacking the necessary resources to complete two or more tasks simultaneously, often lacking the necessary resources to complete their expected task.

"Counseling Matters: A multi case study of high school counselors and their observations of their role in the school community conducted a qualitative research through an empirical case study research of six participating high school counselors from five Wake County high school where each school somewhat different from the others. There were 3 male and 3 female; four Caucasian and two African American. Open-ended questions were investigated to study the phenomenon of counselors' perceived role, daily activities, goals and overall thoughts about their jobs. The issues tackled as follows: 1) role definition and administration support in which the participants indicated that their duties were not always clearly defined, and were not always reflective of their written job descriptions; 2) time and caseload wherein the study participants' caseload range from 450-600 students which is above the number recommended by the ASCA ratio as 250:1; c) expectations as counselors participating in this study talked about a shift in thinking as they face new accountability requirement; d) impact on professional self-efficacy; further discussed the impact of the daily situations they experience as high school counselors as they reflected on their beliefs about what makes a good counselor, their own feeling of effective and success and their overall satisfaction in the profession.

In "Effects of non-guidance activities, supervision, and student-to-counselors ratios on school counselor burnout" conducted categorized multiple regression analyses. Web-based surveys were sent to ASCA's regional and state representatives and total of 382 counselors completed the survey. Of the 382 respondents, 52 were male, 325 female and 5 unknown; 111 participants worked in elementary school settings, 85 in middle school, 128 in high school settings and 58 unknown. From the hierarchical regression analysis summary for variables predicting school counselor burnout from the six model all of which the non-guidance duties accounted significant portion while the supervision 4 out of 6 models accounted significant portion.

Implications of case studies

This section discusses the implications of these studies. The need for some collaborative planning among counselors as they strive to contribute to students' academic, personal and career development while can currently struggling with the ever increasing demands of their jobs. Also school administrators may need to look to their counseling staff for ways to be better informed about the characteristics of a comprehensive school counseling program as the array of service a qualified counselor can realistically provide in a school. School counselors need to highlight the success of their program and connect their program goals to the mission and goals of the school are better able to define their role. When it comes to supervision, school counselors need to receive adequate supervision to feel more competent in their duties and it provides school counselors with an avenue to vent frustrations that come about that may help increase empathy for students. School counselor's education program should make adjustments to more closely reflect real life demands experienced by school counselors, rather than relying solely on teaching theory and counseling skills. Providing information to parent and students regarding the appropriate role of the counselor may lessen the burden on counselors expected to do therapy with students or who are expected to change schedules in order to facilitate the parent, student and administration or teacher from having to address interpersonal conflicts.

Evaluation & limitation

This section evaluates the quality of each study. Some of the studies have a strong features that are worth mentioning. Each of these studies have at least one weakness that pull down the value of their findings. The earliest study used an open ended questionnaire and researcher triangulation was incorporated. Another study used a demographic questionnaire and to further validate the study through triangulation. The latest study made through webbased surveys as regression models were chosen because the primary focus of the article is predicting the effect of the three identified predictor variables. With the instruments used, two studies may not be conclusive with their findings due to the size of the participants and the other study due to all participants were member of the same organization. Comparison of three studies in two years interval reflected that the same problem will be observed in the coming years of the school counselors' career. If ever burnout or job stress was experienced by the school counselors their advocacy to their students keep their motivation in place at the end of the day.

Conclusion

School counselors often come into profession with their own idealized version of counseling. School districts often do not have clearly identified counseling duties, leaving administrators who have little, if any, understanding of the school counseling function to assign duties they think are appropriate such as testing, scheduling, and monitoring class size. Among other administrators, teachers, and parents often have conflicting beliefs about the school counselor's role, resulting in an overwhelming demand on the counselor's time with limited resources available to perform at optimal levels. Counselor may aid their own efforts to avoid non-guidance activities by advocating for their position and responsibilities. School counselors who firmly establish their role within the school maybe surrendered from unnecessary non-guidance take and free to explore other ways to benefit the students with their school. Supervision provides confirmation to counselor that they are performing appropriately in their role and also gives mentorship regarding ways to effectively handle job stress. Several recommendations of different time interval however were jammed somewhere for no progress and the issues of burnout still experienced by most of the school counselors.

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Article Review for Alteration of Adolescent Self-Efficacy When Applying Brief Counseling at School

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Citation

A critical review of Rakauskiene, V. & Dumciene, A. (2013). Alteration of adolescent self efficacy when applying brief counseling at school. Social Behavior & Personality: an international journal, 41(6), 893-900.

Summary

This was an empirical quantitative and confirmatory research. The purpose of this study was to show the effect of short-term solution-focused counseling on adolescents' self efficacy, by comparing results of experiment group and comparison group. The research question was: how far can a short-term solution-focused counseling affect adolescent's self-efficacy in issues they face daily at school; such as communication, learning difficulties, emotional problems and changing one's lifestyle, and how long will the impact last? The researchers hypothesized that school seniors who were counseled would have a better self-efficacy which in turn will enhance their self-respect and their ability to deal with personal problems, develop their social skills and boost their self-confidence.

Methodology

The sample the researchers used was 553 students from the senior class in five different schools. Their age ranged between 15-19. They were divided into an experiment group and a comparison group. The experiment group consisted of 253 adolescents, 139 females and 114 males, while the comparison group was of 300 adolescents, 155 females and 154 males. Each adolescent in the experiment group was counseled in personal problems adolescents thought were more urgent. Counseling sessions were between one and six times within a period of one year. They were recruited randomly from five schools in the Republic of Lithuania during 2011 and 2012. Counseling sessions occurred in the room of the school psychologist, and each session lasted between 50-60 minutes.

Procedures

In regards to the procedures of the study, during the counseling sessions, participants were asked to evaluate their problem urgency on the General Self-Efficacy Scale (GSE) which consisted of 11 statements on a 4-point scale ranging from 1=totally disagree to 4= totally agree. Researchers increased the scale to become an 11-point scale, so evaluators can choose between 0=no problem at all and 10=extremely serious. In the counseling sessions, each adolescent was counseled according to the urgency of his/her problem.

Results

The results of pre-test showed that, the severity of problems for both groups was close. Post test measures showed significant improvement in the experiment group. Their problem urgency was significantly lower. Two tables shared showed the pre and post results for both groups. One of the tables indicated that the impact of solution- focused brief counseling was a long term one.

Evaluation of their problem urgency was measured after 3 months and again after six months. Problem urgency after six months was still lower than before counseling started.

Most adolescents were referred to counseling through an adult; parent or guardian. Only few adolescents sought counseling by themselves, especially when it was psychological counseling. Statistics of the study indicated that most of the problems school seniors sought counseling for were related to communication and relationships whether at school with their peers and teachers, or personal relations.

Critical Reflection

This is an outdated study. Researchers used strong references related to the topic. However, some references used in this article were comparatively outdated, such as (Gibson-Cline, 1996) and (De Shazer, 1985), in addition to a few in 2000 and 2001. Using these references indicates that the researcher is discussing an old topic and not taking the initiative in choosing this specific topic, specially (De Shazer, 1985) which was used as a reference to the solution-focused brief therapy. Yet, the article introduced a new idea in terms of focusing more on adolescents and their self-efficacy in this short term counseling.

Limitations and Recommendations

Researcher concluded by mentioning the study limitation and suggesting recommendations to future researchers. Psychologists who conducted the counseling sessions did not have enough experience, neither enough supervision. The researcher mentioned this as a limitation to the study and a recommendation for future studies at the same time. Moreover, another recommendation mentioned was to investigate the impact of adolescents' age and gender on their self-efficacy in solution-based brief counseling.

An article on explosion of ethnic violence in Warrap state In south Sudan

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Abstract

As matter of facts, ethnic conflict is an outcome of number of interrelated factors. It is important to cautiously and thoroughly study each of these factors and establish relationship among the characteristics involved. Appropriate approach is useful in an endeavor to resolve ethnic conflicts through a peaceful means.

Ethnic conflict leads, among other things, to the breakdown of law and order, the disruption of economic activities, political stability, humanitarian crises and a state of uncertainty which prevent long run investment and development efforts and peace. A case on line is the conflict that broke out between the SPLA and SPLA in opposition on 15th December 2013, in South Sudan, all the developments made from independence till the date were gone.

Violent ethnic conflict leads to extraordinary displacement of people including vulnerable groups such as women, children, the elderly as well as the disabled who often are seriously affected by violent conflict. Therefore, it is worthwhile to give due concern to interethnic relations and manage it cautiously and systematically. Conflict is like contagious disease. Unwise handling of conflict gives it the opportunity to widespread all of a sudden. If it occurred, conflict must be handled at its early stages. Once allowed to escalate, it would change to violence that cannot be easily remedied and control. A good example is the Central Africa Republic ongoing ethnic violence between the Muslims and the Christians (Alemayehu, Fantaw. (2009).

Key Words :*The key words in this article are: Dinka, Nuer Jurchol, Bongo and ethnic violence*

1 Background of the study area

Warrap State population is dominantly Dinka; it enjoys relative ethnic homogeneity, with exception of the southern part of the state which is occupied by the Jur Chol and the Bongo tribes. It is largely rural society with 98% of the population engaged in animal husbandry and crop farming for livelihoods (Deng, Francis M. 1978).

The Dinka tribe is the biggest tribe in South Sudan; followed by Nuer tribe, they occupy south central Sudan along the White Nile River and its tributaries, from Renk in the north to Bor in the south and from Bor in the East to Aweil in the west (Deng, Francis M. 1978).

This study which focused on ethnic conflicts among the Dinkas communities of Warrap state will critically scrutinized the cultural beliefs as source of ethnic conflicts. Most significantly the study will explore the various cultural beliefs and how they bring about ethnic conflict and its impact on the social and economic development in Warrap state. The study also sought to identify probable conflict transformation mechanisms to enhance peaceful co-existence among these pastoral communities (Galtung 1996).

Both primary and secondary data was collected to compile the article, it was paramount to collect information from both sources, because Warrap state does not have library neither archive comprehensive enough to obtain the required information.

2 The purpose

Warrap state is deliberately chosen for this study due to its high ethnic violence, spouse battering and capital punishments.

3 Critical review

3.1 Impact of the war in south sudan

Ethnic conflict can play a crucial role, both in the collapse of the central government; and at the extreme cases, the disintegration of the country totally, as the case with the current escalation of ethnic conflict in Somalia and South Sudan.

Looking from economic point of view, ethnic conflict destroys the very bases of development: environmental resources, economic, infrastructure, and the social and civic ties that permit and sustain development. The total breakdown of the country's infrastructure and other economic resources in South Sudan can be taken as good examples. When there is violent conflict in a country, resources that otherwise could have been invested for development activities, would be shifted to cover the expense of the war. The industrious labor force will be drained to the war front and hence production and productivity decline in the countries engaged in the war. In a country where there is violent conflict no investors would like to invest, and therefore no job opportunities created for the people. Trade and other social and civil institutions either completely or partially cease their services as a result of which life become costly and terrible. Conflict is a major factor of vulnerability that destroys people's social and private property and trigger unemployment in the area. Agriculture activities ceases, famine creep in, looting and high mortality due to malnutrition sours high the nation is weaken (Shibru D, 2009 p24).

3.2 Social and economic status of warrap state people

The main source of livelihood is Cattle; these animals form the basis of Dinka livelihood, religion, and social structure. The importance of cattle in the Dinka economy has had great influence in the politics of contact between the Dinka and other pastoral and non-pastoral communities in South Sudan. This contact was initially based on exchange, but has gradually developed into hostility, as Dankas herding, they desire their neighbors cattle and their neighbor desire Dink's cattle too. The non – pastoral community were inconvenient because the cattle sometimes eat food crops of the peasants resulting into fights, famines and environmental degradation due to over grazing. Cattle have been both directly and indirectly a major cause of the rise of conflicts in the region as they represent social, cultural, and economic security of the Dinka community (Deng, Francis M. 1978).

3.3 Structural violence

This article introduces the concept of cultural violence and can be viewed as trajectory to better understanding of structural violence in mostly rural society in Warrap State. South Sudan community has witnessed a sharp increase of ethnic violence in Greater Bahr el Ghazal including Warrap State over the last 2 years. Other people attributed the increase of violence to the dwindling economy and poverty and war. Other people think the cause of the ethnic violence is the existing culture of violence among the community of Bahr el Ghazal and especially Warrap State. This article was developed to provide readers with better understanding of interaction between War, Culture, and poor law enforcement, promotion of impunity, marginalization and macho man. The availability and existence of these factors in the country was considered as precipitating factors to the current structural violence. Violence is defined here as any aspect of a culture that can be used to legitimize violence in its direct or structural form. In this article, cultural violence is viewed as used to legitimize both negative and positive social practices in a community.

3.4 The context of violence in warrap state

In the context of South Sudan, the cultural violence in Warrap State is protected under the premise of security to animals and properties from neighboring tribes, but to the contrary, the same community does raid cattle among themselves creating vicious circle of violence within the same community and this was seen in Warrp state where this study was undertaken.

The consideration of culture as a major factor in the ethnic violence and spoiler of peaceful coexistence within diverse communities in Warrap State is a land mark for quest of better strategies to establish peaceful coexistence among the cattle keeper.

The study aim at generating possible tangible strategies to curb the level of violence among communities in Warrp state and if appropriate extended to other states in greater Bahr el Ghazal where similar violence is ongoing.



Image adopted from: https://www.google.com/search?q=cattle+raiding+in+jonglei&tbm

Warrap state is one of the states affected with ethnic violence, un-justified killings, spouse battering and capital punishment is rampant.

The scope of the study was constrained by financial limitation of the investigator; the study could have been expanded to cover the greater Bahr el Ghazal states which are equally heavily affected by the current ongoing ethnic violence. However within the current confine of the study, fascinating facts have been obtained which suggest weakness in the current national structures as well as the governing machineries available for the welfare of the South Sudanese communities as the contributing factors to the escalation of the violence.

3.5 Law enforcement

Interaction with the respondents 21% revealed that, people who were killed on the street, in their homes, during cattle raiding are victims of poor law enforcement in the country. They argue that the criminals were not caught because they either have relatives who are very senior in the government or feared that their community will seek revenge on the policeman who arrest him. Others argue that criminals are deliberately released from dungeon without punishment through intervention of their senior relatives in the government.

3.6 The customary law of compensation for killing

The respondents 3% argue that payment of huge amount of cattle to compensate for killing is another causative factor for violence; firstly, the cows for compensation of the death person are contributed by the relatives of the killer, which makes it easier for the criminal to obtain the cows with less difficulty. Secondly, the acceptance by the relative to contribute cattle to compensate the relatives of the assassinated person is a clear promotion of impunity which breed structural

violence. Thirdly, due to such practice, it has become easier to practice the culture of revenge killing as long as the relatives are willing to pay for the killing. Finally, the government within the current scope of extra judicial killing has accepted the traditional laws of compensation of victims without additional conditions/punishment that could make the killers feel the negative effect of taking the law into their hands.

3.7 Arms Proliferation

The respondents (31%) stated that during the current war, many soldiers clandestinely quit their military jobs when asked to go to front line, because they quitted secretly, they kept their guns leading to increase of violence and robbery. Majority of participants concur with the above notion, they argue that 98% of killings done were with guns and this applies also to cattle raiding. One of the participants stated that nobody can attempt cattle raiding without possessing a gun.

During the focus group discussion, it came out clearly that other military personnel return from the frontlines with their weapons to stay with them at home leading to unnecessary killing, cattle raiding, robberies and social misconduct

Majority of respondents 70% argue that military personnel do not wish to leave their jobs because it is their source of livelihood, but the notion that the current war is tribalistic in nature have added into the defection out of the profession.

3.8 Spouse battering

In a focus group discussion, it came out that the increase of violence at home e.g. spouse battering and capital punishment could be attributed to the culture and behavior of Macho man, especially among soldiers and people who participated in the war. Most perpetrators of violence are former soldiers or people who have contributed in the movement in one way or another and have connection with senior officials in the government; therefore such individuals put themselves above the law.

3.9 The attitude of impunity

Almost 100% of the respondents concur that every person in South Sudan claim to be a soldier, and in every argument, they ask their opponent do you know who I am. Meaning he is a very senior officer in the army, police, wildlife, security and etc. and have the prerogative to kill you or do anything to you and will not be prosecuted. This concession is true because many criminals who have committed crimes in similar manner have either being left free or not arrested at all. This promoted the spirit of impunity among the organized forces in the country

The other argument which came out clearly is that, even those who are not in the army but have their relatives holding high positions in the government or in the army tend to take the law into their hands, because whatever crime they do, they are released from incarceration without prosecution. The Government machinery in places seems to favor such individuals and instead punish poor and low class individuals who do not have the capacity to help them self when brought before the court of law, and such poor individual become victims of the law without justices.

3.10 Arms in the hands of civilians



Image adopted from: https://www.google.com/search?q=cattle+raiding+in+jonglei&tbm

Others argue that the increase of violence in the state could partly be due to civilian's accessibility to guns, indeed in Warrap state, many civilians are openly carrying unauthorized weapon without being arrested. People wonder where such people get their arms and munitions. Respondents argue that if the weapon is illegal, then the government would have arrest them for possession of illegal weapons, but nobody has ever been arrested, meaning that it could be the government arming certain community illegally, either as militia or for some bad intentions.

5.11 Causes of mob justices

One of the areas potential for further investigation is the law enforcement in the state as well as in the entire nation, 2% of the participants argue that currently you cannot arrest a thief, because the police officers will first request for money to arrest the culprit and after paying money and the criminal is brought to the cell, the officers request you to feed the criminal or otherwise they will release the criminal without being prosecuted

According to the 2% participants, this act by the law enforcement body led to the circle of revenge attacks. Offended individuals simply belief that since they cannot get their rights through the legal and justice's center of the country, they better kill, punish or revenge directly.

Mob justice in many countries can be defined as people taking the law into their hands by killing or punishing members of the community who misbehaved e.g. stealing and etc. in South Sudan it is differently viewed, it posters itself in revenge attacks and killings, other respondents argue that the fact that no one still get his rights from the legal machinery of the government has increased the level of revenge attacks. They argue that many criminals are released without prosecution from incarceration. This encroached into the dignity of the accuser and his or her rights of being a citizen in the country where his or her property has been stolen.

5.12 Psychological effects of the war

Others argue that the level of violence witnessed in the state as well as in the country could be attributed to psychological effect of the war. Many believed that people are traumatized because others lost properties, lost their family member, lost their jobs and many more, but, because there is nowhere to ventilate the stress due to lack of psychiatry and counseling services in the country, they ended up being violent.

Eye witnesses confessed that majority of war victims saw their mothers, sisters or wives rape or parents killed. Yet such individuals are left without psychological care, they struggle on their

own to recover from the trauma. Many believed such lack of psychological services contributed to the explosion of violence in Warrap state and other parts of the country (United Nations Mission in the Republic of South Sudan, May 8, 2014.).

5.13 Youth education and Joblessness

History shows that majority of people participating in violence acts are young adults and they are the majority who have been in the army. This is not by coincidence, because the biggest population of the country is young men and is actively participating in the ethnic violence.

The facts that majority of these population are jobless, it made them potential tools for the rich to utilize them execute their malicious aims

The respondents stated that majority of youth in Warrap are not educated, hence are easily exploited. They call for the government to establish vocational training centers where such youth can be trained on how to obtain their future livelihoods.

According to South Sudan bureau of statistics, 2009: Total Population of South Sudan is 8.26 million

- More than half (51%) of the population is below the age of eighteen.
- 72% of the population is below the age of thirty
- 27% of the adult population is literate

In Warrap 91% of its population live in rural areas compared to 83% in South Sudan as a whole. 16% of the 15 years and above population is literate. This increased to 27% for the age group 15-24 respectively (*National Baseline Household Survey 2009).*

Meaning that majority of youth in Warrap are not educated hence possibility of exploitation for malignant purposes.

Other respondents argue that unless education is made compulsory, parents and care takers are punished for not taking children to school, the level of violence will not reduce. They cry for new education polices and curriculum that are more relevant and practical to the current crises. It is the responsibility of the government to take care of the street children for development of skills and appropriate morals as future citizens of this country. Children who drop out of schools due to fees, stubbornness and etc. should be hunted and taken to vocational training centers where they can be remodel for better future benefit of the state (Jok, Jok Madut 1998).

5.14 Culture and violence

The fact that the culture in Warrap state is a polygamous culture where men are marrying 10 to 20 women even above, this culture pose real threat to perpetuating violence, because these families are incapable to care for their children, hence majority goes to the street seeking survival. On the other hand, because life out there is harsh forces them to delinquency, pocket picking and many more. Other participants cry that the government should intervene to stop such culture which first of all dehumanizes women as well as their children. Such culture deprives this vulnerable population of their rights to decent lives; therefore government should impose smaller families' police so that few or no children find their way to the street.

Women argue that it is this culture of polygamy that made men unable to care for their families; in terms of health, nutrition and education. Men leave their families to play cards and domino till evening bringing nothing home with the hope that if one wife did not cook the other will. They argue, if this culture is stopped a new down will arise where men take responsibility of their families and desire smaller families to enable better upbringing of children both educationally and socially.

The study also found that men who have married more than five women tend to leave their wives in the villages, go to the town and marry young girls to enjoy life, while the older wives are left in the villages without upkeep allowance to support their children. These frustrate children to leave their homes and go to towns seeking survival as street children.

A woman too, having been abandoned seeks means of survival, others brew alcohol others engaged in prostitution leading to increased risk of contracting sexual transmission infection and distributing HIV. The act of abandoning women to the village is equal to psychological violence where the victim is tormented silently till she makes such negative decision to her own detriment.

6.0 Conclusion

The cause of increased ethnic violence in Warrap state can be attributed to horde of factors: political, socio-economic and cultural. Poor law enforcement is implicated in bringing about the vicious cycle of revenge killing. Others argue that promotion of impunity by the top ruling figures acted as precipitating factors for the ethnic conflict. People took the law into their hands because they see criminals left free without prosecution.

Availability of arms in the hands of civilians increased the level of violence and cattle raiding leading to unnecessary killings and looting

7.0 Reference

[1.] 5th Population and Housing Census (2008)
[2.] Alemayehu, Fantaw. (2009).Conflict Management in the Ethiopian Multi-national Federation European University, Center for peace studies (MA Thesis), Stadtschlaining.
[3.] Census Priority Results (2009)
[4.] Deng, Francis M. (1978). Tradition and Modernization: A Challenge for Law among the Dinka of Sudan. New Haven: Yale University Press.
[5.] http://www.br.de/radio/bayern2/sendungen/notizbuch/suedsudan-krieg-nationalstaat-100.html
[6.] https://www.google.com/search?q=cattle+raiding+in+jonglei&tbm
[7.] Jok, Jok Madut (1998). Militarization, Gender and Reproductive Health in South Sudan. Lewiston, NY: Edwin Mellen Press.
[8.] Miraya FM, “Warrap State to Aid Return of Abyei Citizens,” July 31, 2013, http://reliefweb.int/report/south-sudan-republic/warrap-state-aid-return-abyei-citizens
[9.] Radio Tamazuj, “Hunger Among Displaced in Gogrial West,” July 15, 2014. https://radiotamazuj.org/en/article/hunger-among-displaced-gogrial-west
[10.] Small Arms Survey, Human Baseline Assessment for Sudan and South Sudan
[11.] Southern Sudan Household Health Survey Report (2006)
[12.] Southern Sudan Livelihood Profiles (2008)
[13.] Statistical Yearbook for Southern Sudan (2009)
[14.] United Nations Mission in the Republic of South Sudan, Conflict in South Sudan: A Human Rights Report, May 8, 2014.

The Experiences of People Living with HIV/AIDS, On Antiretroviral Medications

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Abstract:

This study has been conducted specifically to explore the experiences of people living with HIV/AIDS and taking antiretroviral medications in Nairobi. This study specifically sought to: describe individuals' feelings before and after initiation of antiretroviral medications; ascertain whether there is stigma associated with taking antiretroviral medications; Identify support mechanisms available for people taking antiretroviral medications; describe challenges individuals face as a result of taking antiretroviral medications, and establish coping mechanisms available for antiretroviral medication related challenges.

This study was a cross sectional qualitative inquiry that used in-depth interviews to explore the experiences of people on antiretroviral medications in Nairobi. The results showed that before taking antiretroviral medications, participants were feeling hopeless, sad and frustrated. However, when they started the antiretroviral medications, their feelings changed positively to feelings of hope and courage. Family support is crucial for good adherence to antiretroviral medications; though these medications pose the greatest challenge of treatment side effects. In summary, this study showed that antiretroviral medications are a greatest investment in the physical, medical and psychosocial welfare for people living with HIV/AIDS.

Introduction:

The Human Immunodeficiency Virus (HIV) infection is a global pandemic, causing disease and death in nearly every country in the world. HIV-1 is the strain of the virus that causes disease in most of the world, including Kenya. HIV is a human retrovirus capable of producing profound immune deficiency by gradually destroying T-helper (CD4) lymphocytes; thus, inhibiting the body's ability to fight-off many diseases. Infection with HIV can result in a cluster of symptoms that are recognized as the Acquired Immunodeficiency Disease Syndrome (AIDS). HIV slowly degrades the body's ability to ward off infections and other illnesses and was considered a terminal illness when identified in the early 1980s. Although AIDS-related deaths are declining, the number of people living with HIV/AIDS continues to increase. The total number of people living with the virus in 2008 was more than 20% higher than the number in 2000, and the prevalence was roughly threefold higher than in 1990 (UNAIDS, 2009). The continuing rise in the population of people living with HIV reflects the combined effects of continued high rates of new HIV infections and the beneficial impact of antiretroviral therapy.

Review of Literature:

In several recent studies, people living with HIV and AIDS have still reported high stigma and discrimination experiences (Gilbert & Walker, 2009; Simbayi et al., 2007; Wolfe et al., 2006). Logie and Gadalla (2009) conducted a meta-analysis on relationships between HIV-related stigma and a range of demographic, social, physical, and health characteristics in North America, and found high stigma level was consistently and significantly associated with lack of social support, poor physical health, poor mental health (including depression), lower age, and lower income. Smith et al (2008) found a negative, homogenous correlation between stigma and disclosure. Some recent studies, for example, Dlamini et al (2009) have linked AIDS stigma to

lower adherence to anti retroviral therapy. There have been relatively few studies on the pathways of AIDS stigmas experienced by people living with HIV and AIDS. Pearson et al. (2009) found one year after initiating anti retroviral therapy in Mozambique, participants reported no change in stigma, a decrease in perceived social support, and an increase in depressive symptoms, and Kaai et al. (2007) found in a study cohort of people on antiretroviral therapy in Mombasa, Kenya, that levels of internalized stigma decreased significantly after 12 months on treatment and social support remained high at follow-up.

However, this study was limited due to the fact that there was no control group to compare these findings.

Objectives:

- Describe individuals' feelings before and after initiation of antiretroviral medications
- Ascertain whether there is stigma associated with taking antiretroviral medications
- Identify family support mechanisms available for people taking antiretroviral medications
- Describe challenges individuals face as a result of taking antiretroviral medications
- Establish coping mechanisms available for antiretroviral medication related challenges

Method:

In this chapter, the techniques and methods used to design, collect, and analyze the data for this research are explained. This study used a qualitative inquiry for the reason that I wanted to explore deeply into the individual experiences of people living with HIV/AIDS on anti retroviral medications. The ultimate aim was to gain insight into participants' attitudes, behaviours, value systems, concerns, motivations and aspirations with regard to taking anti retroviral medications. This allowed for more diversity in responses as well as the capacity to adapt to new developments or issues during the research process itself and provided richness and depth of explorations and descriptions.

Participants:

A convenience sample of three men and three women participated in this study. Three people from each gender were conveniently chosen because they volunteered to be interviewed provided confidentiality and privacy were guaranteed; and I seeking experiences from both gender for comparison purposes. In order to participate in this research, eligible individuals were receiving medical care at this Nairobi health care clinic, were HIV infected, on antiretroviral medications for at least the past twelve months from this clinic and were aged 30 to 50. The age ranges of 30 to 50 were chosen because the researcher assumed that age bracket would have a lot of experiences to share given in that age group people usually have a lot of responsibilities, alongside relationship issues and cultural, and society expectations. This sample provided a distinguishing benefit because it allowed exploration of lived experiences of the participants and offered richness with which to explore counseling related knowledge.

Design:

This was descriptive and cross-sectional qualitative design which described the experiences of people living with HIV/AIDS on Antiretroviral medications in Nairobi, Kenya. The design is descriptive because participants were given the opportunity to narrate their experiences in their own language using their own meanings. It is cross-sectional due to the fact that I interviewed each of the research subjects once with no intention of follow-up interviews. Epistemologically, the use of this interpretive paradigm was paramount to allow participants describe their phenomena using their own words with regard to taking antiretroviral therapy through the use of individual interviews. The data in word source document was arranged according to the guiding questions in the interview guide.

Procedure:

In-depth interviews were conducted using semi-structured guides. The interviews were also audio-taped and there were notes made by the interviewer. Audio-tapes were listened to and transcribed verbatim. The transcript and the notes from the interviews were aggregated and computer typed into one data source in word. This formed the source document for analysis.

Results:

The participants' discussions focused on their experiences with taking antiretroviral medications largely in line with the objective of this study which was to explore participants' experiences relating to taking antiretroviral medications. Five major themes emerged: a) duration on antiretroviral medications, b) feelings before and after initiating antiretroviral medications, c) perceptions of stigma as a result of being on antiretroviral medications, d) challenges associated with taking antiretroviral medications and e) coping mechanisms.

All the participants were taking antiretroviral medications for over three years. However this period varied from three years to twelve years. Majority of the participants knew that they were HIV positive at least seven years before being initiated on antiretroviral medications and this emanated from severe attack by a major infection or out of curiosity. One participant put it this way "*I knew I was positive in 1998… In 1998 I was diagnosed and first I was put on treatment for six months only injections for TB and treatment for TB that time I thought I was cured and went to work, back to work in 2001. In 2004 the disease came with a bang and I was thinking I was cured, so I was very you understand? Very am sickly. I was taken to hospital, this time I was working in West lands Restaurant so I was taken to Coptic Hospital and stayed there for 60 days again with very big or high resistant TB, Typhoid, Malaria and chest problems, each for, with breathing problems after treatment that is when I then started taking the ARV in 2005 to date. When I started the ARV in 2005 my CD4 counts were 17, very low and after six months it went up to 174 and my weight rose from 39 – 63kgs and now am is, is 86kgs, am even controlling it*" (participant no. P0.1). Another participant said "*It was in the year 2003 I decided to test myself because I was alone in a VCT centre out of curiosity. I almost fainted when it read positive so I decided to confirm with the senior lab technologist because I was almost in a state of denial*" (participant no. P0. 4)

Understanding how the study participants felt before getting on to life-long medications is relevant for the analysis of our findings. In this study half of the participants explained their feelings before antiretroviral medication initiation (P01, P04 and P06). Feelings of hopelessness, frustration and fears of death were palpable among the study participants. "*I was so stressed then, depressed and so low, I hated myself a lot and did not believe I could make it "* (participant P04). Another participant said "I *felt very bad, drugs were very expensive that time I knew I was positive, was like the end of my life and then I lost hope completely especially when I gave birth in 1992 at Kenyatta National Hospital and my child died*" (participant P03). Others experienced fears of death. " *I felt like I would die too like my --- that time there was no counselling and if one knew was positive, that was a death sentence*" (participant P03). Another participant echoed the same words like the one above "*I say I was quickly dying!"* (Participant P06).

However, these feelings were reversed as individuals started antiretroviral medications.

Hope was restored because of starting on life-long medications as they hoped to live longer and plan future activities, achievements and relationships. Hope helped them to compare the inevitable bad days and increased their capacity to appreciate the restoration of good health because of taking antiretroviral medications.

Discussion:

This study was a cross sectional qualitative inquiry that explored participants experiences for the period they had been on antiretroviral medications. The findings are varied touching on a number of issues but on the overall, patients appreciate the role of antiretroviral medications in their lives as they have been able to regain and restore normality in as far as physical and psychosocial functioning is concerned which were slowly but surely diminishing.

HIV infection is generally associated with immorality in the Kenyan society and many people infected with this disease may have feelings of having committed an abomination or eroded cultural, traditional norms and values. In this study, the principal investigator found that participants' feelings before being initiated on antiretroviral therapy were predominantly negative; that is feelings of hopelessness and feeling frustrated. This suggests that the feelings of hopelessness meant that society had rejected them as un-worthy living and this is comparable with the person-centred notion of self-structure (Rogers, 1951; Chantler, 2005). This is also comparable to a study by Roberts et al (2001) in which they examined risk for depressive symptoms and perceptions of stress among HIV positive men and women; where investigators were interested in exploring the role that acute stressful life events might play in the development of these forms of emotional distress, and in testing whether or not psychological diatheses including neuroticism, low self-esteem, and dysfunctional attitudes moderate the association between acute negative life events and emotional distress and found that negative events might have acted as an additional burden over the ongoing chronic stress of HIV illness, and ultimately contributed to the development of depressive symptomatology. These findings were consistent across analyses based on our aggregate measure of vulnerability and each of its three individual components (neuroticism, low self-esteem, and dysfunctional attitudes).

Summary:

As people living with HIV/AIDS start taking antiretroviral medications, feelings of hope, courage and joy, which had been deprived by HIV disease, are restored. However, due to feelings of discrimination and stigma, they restrict their pleasant feelings to themselves and their immediate family members they consider important in their lives.

Social support from families is crucial for patients taking antiretroviral medications.

Anti retroviral therapy related side-effects are the biggest challenges facing people living with HIV/AIDS in Nairobi. In summary, this study has increased on our understanding of the experiences of people living with HIV/AIDS taking life-long medications and it adds new knowledge on the already existing body of knowledge about the experiences of people living with HIV/AIDS not only in Kenya but in the entire world in general.

Implications of the study:

The present study provides evidence that there are a multitude of issues that require counselling in this population. The findings of this study have implications for counselling practice including the type of counselling models best suitable for people living with HIV/AIDS taking antiretroviral medications. Adherence counselling and the coping and stress management theories are paramount for people struggling with ARV-related side-effects. Wood et al (2003) argues that adherence is the strongest determinant of patient survival. The complex issues of medication compliance demonstrate that evidence-based practice in psychological care of HIV patients is critical and suggests how important it is to focus counselling efforts by using evidence best practice approaches available.

References:

[1.] Chantler. (2005). From disconnection to connection: Race, gender and the politics of therapy. *British Journal of Guidance & Counselling, 33*(2), pp. 239-256.
[2.] Dlamini, P.S., Wantland, D., Makoae, L.N., Chirwa, M., Kohi, T.W., Greeff, M., … Holzemer, W. L. (2009). HIV-stigma and missed medications in HIV-positive people in five African countries. *AIDS Patient Care STDS, 23*(5), pp. 377_387. and psychological adjustment to HIV/AIDS. *Psychosomatics, 44*(6), pp. 485-491.
[3.] Gilbert, L., & Walker, L. (2009). Stigma as experienced by patients in an HIV/AIDS Clinic in Johannesburg, South Africa. *Health & Social Care in the Community, 18*(2), 139_146.
[4.] Kaai, S., Avina, S., Luchters, S., Geibel, S., Munyao, P., Mandaliya, K., Shikely, K., Temmerman, M., and Rutenberg, N. (2007). *Changes in stigma among a cohort of people on antiretroviral therapy: Findings from Mombasa, Kenya*. Nairobi: Population Council HIV antiretroviral treatments, access and adherence in an ethnically diverse sample of men who have sex with men. *AIDS Care, 15*, pp. 89-102.
[5.] Logie, C., & Gadalla, T.M. (2009). Meta-analysis of health and demographic correlates of stigma towards people living with HIV. *AIDS Care, 21*(6), pp.742-753.
[6.] Pearson, C.R., Micek, M.A., Pfeiffer, J., Montoya, P., Matediane, E., Jonasse, T., Gloyd, S. (2009). One year after ART initiation: Psychosocial factors associated with stigma among HIV-positive Mozambicans. *AIDS and Behaviour, 13*(6), pp.1189-1196.
[7.] Rogers, C. (1951). *Client-Centred Therapy*.: Constable: London
[8.] Simbayi, L.C., Kalichman, S., Strebel, A., Cloete, A., Henda, N., & Nqeketo, A. (2007). Internalized stigma, discrimination, and depression among men and women living with HIV/AIDS in Cape Town, South Africa. *Social Science & Medicine, 64*(9), pp.1823_1831.
[9.] Smith, R., Rossetto, K., & Peterson, B.L. (2008). A meta-analysis of disclosure of one's HIV-positive status, stigma and social support. *AIDS Care, 20*(10), pp.1266-1275.
[10.] UNAIDS. (2009). *Annual Report, 2009*: UNAIDS. Geneva:
[11.] Wolfe et al. (2008). The impact of universal access to antiretroviral therapy on HIV stigma in Botswana. *American journal of Public Health 98*(10), pp. 1865-1871.
[12.] Wood, E., Hogg, R. S., Yip, B., Harrigan, P. R., O'Shaughnessy, M. V., & Montaner, J. S. (2003). Effect of medication adherence on survival of HIV-infected adults who start highly active antiretroviral therapy when the CD4+ cell count is 0.200 to 0.350 × 10(9) cells/L. *Annals of Internal Medicine, 139*, pp. 810–816.

Polychelates of Trivalent Selected Metal Ions of '4f' Block With Phenolic Resin and Their Antimicrobial Activities

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Abstract

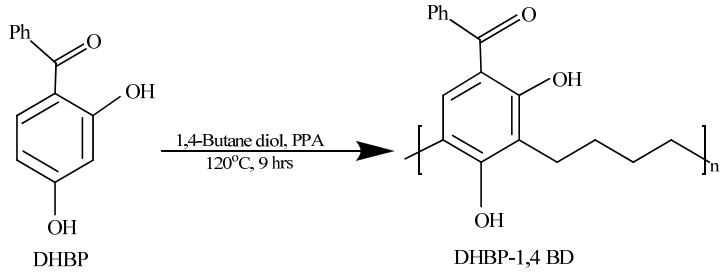
The polymeric ligand (resin) was prepared from 2,4-dihydroxy benzophenone with 1,4-butane diol in presence of polyphosphoric acid as a catalyst at 160° C for 13 hrs.. The poly [(2,4-dihydroxy benzophenone) 1,4-butylene] i.e. H(DHBP-1,4-BD) forms, 1:2 metal: ligand chelates with La(III), Pr(III), Nd(III), Sm(III),Gd(III), Tb(III), and Dy(III). The polymeric ligand and its polychelates were characterized on the basis of elemental analyses, electronic spectra, magnetic susceptibilities, thermogravimetric analysis, NMR and IR results. The molecular weight was determined using number average molecular weight ($\overline{Mn}$) by the vapour pressure osmometry (VPO) method. All the polychelates are paramagnetic in nature except La(III). The resin and their polychelates were tested for antimicrobial activity against E. coli, B. substilis, and S. aureus (bacteria) and S. cerevisiae (yeast). It is found that the synthesized polychelates can be used as an effective and efficient antibacterial agents.

Keywords: poly[(2,4-dihydroxy benzophenone),1,4-butylene]; lantheanides(III); polychelates; thermal study; antimicrobial activity.

Introduction

The first study on metallo-polymer compounds was carried out by Arimoto and Haven in 1955 [1]. These researchers synthesized vinyl ferrocine by free radical polymerization. Recently, several coordination polymers have been prepared from aromatic and aliphatic polymers containing pendant functional groups which act as a chelating group in binding polyvalent metal ions [2]. Chelating polymers have gained more interest, due to their applications in bioinorganic industry, water purification and selective removal of waste materials in nuclear plants [3-5], pollution control [6], selective removal of metals from dilute solutions [7,8], as protective coatings on metal surfaces, as a priming layer or coating on paper, fibre, and fabrics,and selective binding of enzymes [9,10]. The chelates of phenols possess interesting activities in microbial growth inhibition or acceleration. The metalpolychelates depending on their structures can be used as a catalysts, high-temperature and flame resistant fibres, semi conductors, ion exchanging resins, and in agricultural purposes [11-13]. In general, organic polymers have some limitations; therefore, their applications are also limited to some extent. When organic polymers are used as adhesive coatings and exposed to the atmosphere, can be broken down on heating in air most of the time and some of them may be infected by microorganisms such as bacteria and fungi [14]. These problems can be solved by the addition of metal ions in the polymeric system [15], which changes the physicochemical, as well as, biological properties of the polymers [16]. Transition and inner transition metal ions form coordination polymers which are thermally stable and impart both high flexibility due to presence of the organic moiety and thermal

stability due to the presence of the inorganic elements in the same polymeric skeleton. Therefore, due to their superiority over organic polymers, coordination polymers are widely used in scientific and industrial applications. Polymeric coordinating reagents are the novel types of substances possessing a combination of physical properties of a polymer and chemical properties of the attached reagent. In the present work, synthesis, characterization, thermal, and antimicrobial studies of La(III), Pr(III), Nd(III), Sm(III), Gd(III), Tb(III) and Dy(III) polychelates with poly[(2,4-dihydroxybenzophenone) 1,4-butylene] have been carried out. It is observed that the polychelates are thermally less stable than the polymeric ligands but show good bactericidal activity compared to the parent polymeric ligand. Thus, looking into the very effective behaviour of lanthanide polychelates may prove some of their excellent antibacterial capabilities. This helps us to guide the basic user to the effects of these metal ions in chemical, biological, soil, and marine systems.



Scheme 1. Synthesis of DHBP-1,4 BD resin

[A] Experimental

1. Synthesis of resin

Polycondensation of 2,4 dihydroxy benzophenone with 1,4 butane diol

To a well stirred and ice-cooled mixture of 2,4 dihydroxy benzophenone(12.84 gm, 0.06 mol) and 1,4 butane diol (5.32 mL, 0.06 mol), polyphosphoric acid (PPA) (20 gm) was added slowly with stirring as a catalyst (Scheme 1.). The reaction mixture was left at room temperature for half an hour and condensed on an oil bath at 155°C for 10 hrs. The reaction mixture was then cooled, poured on crushed ice and left overnight. A brown solid was separated out. It was collected by filtration and washed with cold water and methanol to remove unreacted acid and monomer. The synthesized resin was further purified by reprecipitation from dimethyl formamide with water for three times and dried at 60°C temperature. The purified resin was brown in color. D.P.>Yield 40.50.%.

2. Synthesis of polychelates

All polychelates were synthesized same as earlier reported method [2]. Lanthanum, praseodymium, neodymium, samarium, gadolinium, terbium, and dysprosium acetates (BDH) of AR grades were used in the preparation of the polychelates. The polymeric ligand (2.68 g, 0.01 mol) was dissolved in DMSO (50 mL). The metal acetate (0.005 mol) was also dissolved in DMSO (25 mL). The hot and clear solution of the metal acetate was added with constant stirring to the hot and clear solution of ligand. A dark red coloured product separated out immediately. The suspension was digested on a water bath at 90 ^{O}C for 2 hrs and than filtered. The solid was washed with hot DMSO to remove unreacted metal acetate. Finally, the product was washed with acetone and dried at 60°C for 24 hrs.. The yield of each polychelate obtained was between 60-80 %.

Table 1. Analytical Data of DHBP-1,4 BD resin and its Polychelates

Compound	Formula weight of Repeating unit	% Found (Calculated)			μ_{eff} (B.M)
		M	C	H	

$(DHBP\text{-}1,4\ BD)_n$	268	---	76.08	6.01	---
$[C_{17}H_{16}O_3]_n$			(76.10)	(6.01)	
$\{[La(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	726	19.07	56.15	4.80	Diamagnetic
$[C_{34}H_{35}O_9La]_n$		(19.11)	(56.20)	(4.85)	
$\{[Pr(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	728	19.37	56.10	4.87	3.71
$[C_{34}H_{35}O_9Pr]_n$		(19.34)	(56.05)	(4.84)	
$\{[Nd(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	731	19.75	55.83	4.84	3.61
$[C_{34}H_{35}O_9Nd]_n$		(19.70)	(55.79)	(4.82)	
$\{[Sm(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	738	20.40	55.35	4.81	1.77
$[C_{32}H_{31}O_9Sm]_n$		(20.37)	(55.33)	(4.78)	
$\{[Gd(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	744	21.15	54.85	4.75	7.91
$[C_{34}H_{35}O_9Gd]_n$		(21.11)	(54.82)	(4.73)	
$\{[Tb(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	746	21.33	54.70	4.75	9.47
$[C_{34}H_{35}O_9Tb]_n$		(21.28)	(54.69)	(4.72)	
$\{[Dy(DHBP\text{-}1,4\ BD)_2(H_2O)_2].OH\}_n$	750	21.70	54.50	4.72	10.67
$[C_{34}H_{35}O_9Dy]_n$		(21.66)	(54.43)	(4.70)	

DHBP-1, 4 BD = poly[(2,4 dihydroxy benzophenone)1,4-butylene]

[B] Analytical procedures

Carbon and hydrogen were analyzed with a Coleman C, H, N analyzer (Table 1). The metal content was determined by titration with standard disodium salt of EDTA after decomposing the polychelates with a mixture of concentrated hydrochloric acid, sulphuric acid and perchloric acid in a 5:2:3 mL ratio, respectively. Magnetic susceptibilities were measured by the Gouy method at room temperature. The IR spectra of the samples in KBr pellets were recorded on a model 938 Perkin Elmer spectrophotometer. Thermal measurements were performed using a Du Pont thermal analyzer at heating rate of 10°C min-1. ^{1}HNMR spectra were determined in DMSO-d6 by FTNMR spectrophotometer using TMS as an internal reference. The number average molecular weight ($\overline{Mn}$) of polymeric ligand (resin) sample was measured by a VPO (Knaur, Germany) using DMF as a solvent at 90°C and polystyrene (PS) as a calibrant.

[C] Results and discussion

1. Infrared spectra

Resin

The IR spectroscopy showed a broad band appearing in the range 3200-3400 cm-1 due to -O-H stretching in the polymeric compound. The presence of -OH group originate from the phenolic hydroxyl group and water absorbed by resins. The major contribution to this particular band comes from the absorbed water. The band due to -OH stretching is less broad in the IR spectra of the polymer, which suggests the absence of absorbed water. Hence, this band may largely be due to the presence of hydroxyl groups. The strong band of -C=O around 1635-1655 cm^{-1} which suggests an ortho hydroxy aryl compound (intramolecular hydroxy bonding) and a weak band of -OH at 2740 and 2765 cm^{-1} indicates an intra molecular hydrogen bond. The band in the range of 1250 ±10 cm^{-1} is attributed to -OH in plane bending. The bands observed around the 1480-1510 cm-1 region is attributed to -C=C stretching (aromatic) vibrations. The band in the region of 2940 ±10 cm^{-1} is attributed to the $-CH_2$ groups. The band in the region 1020-1170 cm^{-1} is attributed to -C-H in plane bending. In the spectra of each of the resin, a band observed around 890 ± 10 cm^{-1} is due to isolated hydrogen on the phenolic moiety repeating unit of the polymer chain. The band around 860 – 900 cm^{-1} may be attributed to the l, 2, 3, 4, and 5-penta substituted phenyl ring, having only one isolated H atom. The presence of a band around 860-900 cm^{-1} suggests that the linkage in the resin chain occurs through 3 and 5 positions of the monomer. The important IR frequencies of the polymeric ligand and its polychelates are shown in Table 2.

Table 2. Infrared spectra of the polymeric ligand and its polychelates (cm^{-1}).

Compound	V (O-H)	V- (-CH2) Bridge	V (C=O) Chelate	V (C=C) Aromatic	V (Ar-O-R) Ether linkage	V Penta substituted-Ph Ring	(M-OH)
(DHBP-1,4-BD)n	3200-3400 (b)	2930 (w)	1655 (s)	1490 (m)	1270 (m)	890 (m) _	___
[La(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	3200-3400 (b)	2925 (s)	1625 (s)	1500 (m)	1265 (m)	900 (m)	465 (w)
[Pr(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	3200-3400 (b)	2925 (w)	1635 (m)	1480 (m)	1265 (m)	900 (m)	470 (w)
[Nd(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	3200-3400 (b)	2930 (w)	1620 (s)	1495 (m)	1260 (m)	890 (m)	470 (w)
[Sm(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	3200-3400 (b)	2925 (w)	1630 (s)	1480 (m)	1265 (m)	890 (m)	465 (w)
[Gd(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	3200-3400 (b)	2925 (w)	1625 (m)	1485 (m)	1270 (m)	895 (m)	465 (m)
[Tb(DHBP -1,4-BD)$_2$ (H2O)$_2$]n	3200-3400 (b)	2935 (w)	1635 (m)	1480 (m)	1270 (m)	900 (m)	470 (m)
[Dy(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	3200-3400 (b)	2930 (w)	1610 (m)	1485 (m)	1265 (m)	895 (m)	465 (m)

b = broad, m = medium, s = strong, w = weak, DHBP-1,4-BD = poly[(2,4-dihydroxy benzophenone)1,4-butylene].

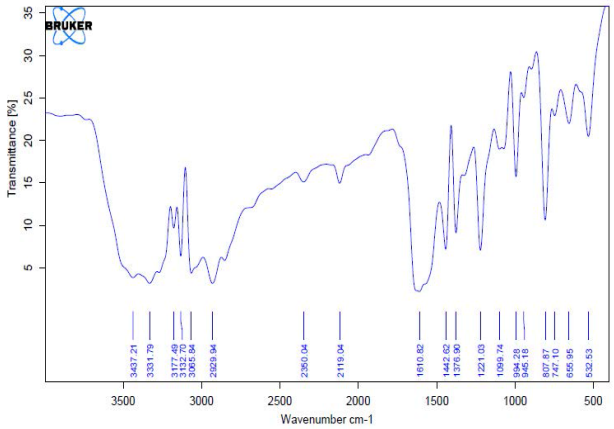
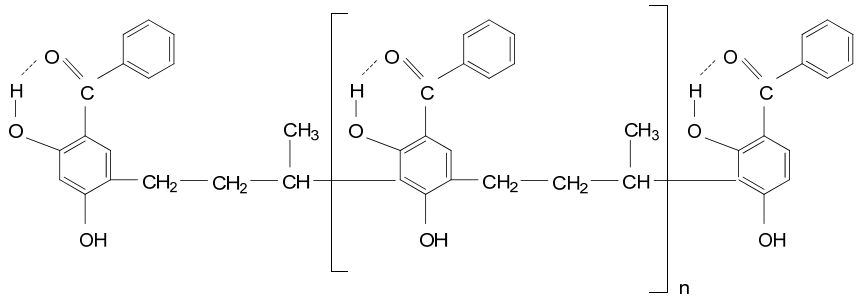


Figure 2. FTIR Spectrum of $\{[La(DHBP\text{-}1,4\text{-}BD)_2(H_2O)_2].OH\}_n$



Scheme 2. The proposed structure of the polymeric ligand.

2. Polychelate

The -C=O stretching frequency in all the polychelates is observed around 1655-1635 cm^{-1}, appearing at a lower frequency of 532.53 cm^{-1}, which suggests -C=O M coordination [17] as shown in Figure 1. In the polychelates the bands observed around 465-480 and 565 cm^{-1} indicate the M-O bond, suggesting that phenolic and carbonyl groups are involved in bond formation with the metal ion. The proposed structure of the polymeric ligand is shown in Scheme II.

3. 1HNMR Spectra

The ^{1}HNMR spectrum of 2,4-dihydroxybenzophenone (DHBP), poly [(2,4-dihydroxy benzophenone) 1,4-butylene] H(DHBP-1,4-BD) and polychelates (M-DHBP-1,4-BD) are presented in Table 3. DHBP shows signals at =12.48, 3.85, and 6.4- 7.51 ppm which are due to -OH group ortho to (Ar- C=O, respectively. H(DHBP-BD) shows signals at = 12.66, 3.85 and 6.50-7.65 ppm which are due to –OH groups ortho to Ar-C=O, respectively [18]. One broad signal at = 1.1-3.12 ppm appears as shown in Figure 2. In all the polychelates the signal of the –OH group is completely disappeared which suggests that the bond formation takes place through the -OH groups ortho to Ar-C=O. Also, aromatic protons were shifted downfield by 0.14-1.32 ppm in the NMR spectra of the polychelates due to the deshielding effect of the metal ion on the ligand protons.

Table 3. ^{1}HNMR data of the polymeric ligand and its polychelates (δ , ppm).

Compound	δ (ppm)		
	-OH	OH Aromatic protons	$-(CH_2)_2-CH(CH_2)-$
DHBP	12.48	6.40-7.51	-
(DHBP-1,4-BD)n	12.66	6.50-7.65	1.1-3.12

[La(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12
[Pr(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12
[Nd(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12
[Sm(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12
[Gd(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12
[Tb(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12
[Dy(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	-	6.65-7.8	1.1-3.12

DHBP-1,4-BD = poly[(2,4-dihydroxy benzophenone)1,4-butylene].

NMR SPECTRUM :

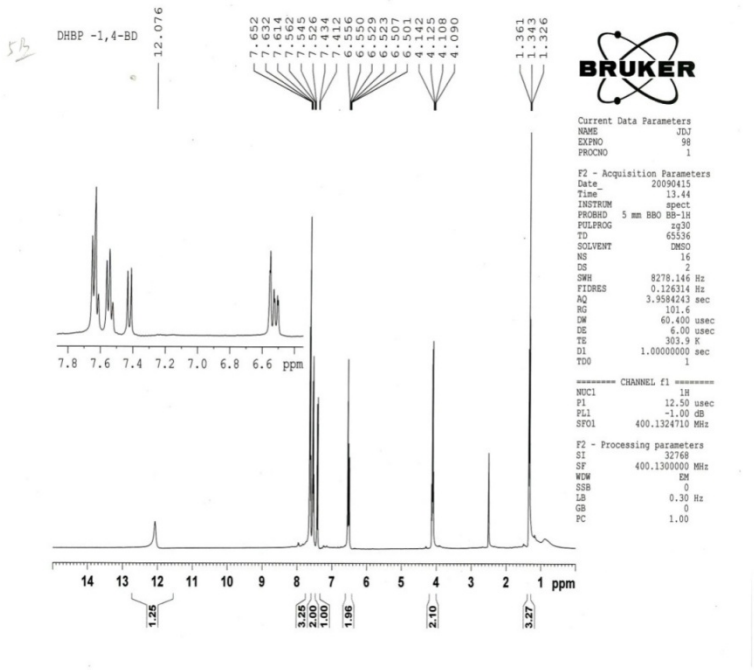


Figure 3. ^{1}HNMR Spectrum of DHBP-1,4 BD Resins

4. Vapour pressure osmometry

The number average molecular weight ($\overline{Mn}$) of the polymeric ligand (resin) sample were estimated by vapour pressure osmometry (VPO) [19] (Table 4). Dilute solutions of polymer samples were prepared to determine ($\overline{Mn}$). Four concentrations 2.21, 4.42, 6.63, and 8.84 g.kg^{-1} were prepared in DMF. The VPO experiment was carried out for each concentration and the corresponding bridge output reading in millivolts was noted. The plot of millivolts vs. concentration was drawn. With the help of the slope and the VPO constant K, the n value of the polymer was calculated and found as ($\overline{Mn}$) = 1177 gmol^{-1}.

5. Thermogravimetric analyses

Thermogravimetric analyses (TGA) data of the resin and polychelates are presented in Table 5. These data revealed that the rate of decomposition of the polychelate is higher than that of the parent resin, suggesting that there may be strong intra molecular hydrogen bonding in the polymer. The absence of such hydrogen bonding in polychelate favours the reduction in thermal stability of polychelates compared to the parent resin. It seems that metal ions accelerate the decomposition of the polychelates. The thermal stability of the ligand and metal chelates is in the order of ligand > polychelates. The presence of water molecules considered as the water of

coordination. According to Nikolaev et al. [20] water elimination above 150°C may be due to its coordination to the metal ion. Hence the nature of the water molecules observed in the complexes is water of coordination, which is supported by cumulative weight loss percentage and thermal data presented in Table 6.

Table 4. Molecular weight determination of resin by vapour pressure osmometry method.

Resin	Conc. Gm.mol-1	S.D. Millivolts	Spole of Plot	$\overline{Mn}$ = K/slope g.mol^{-1}
	2.21	21.00		
	4.48	43.00		
DHBP-1,4 BD	6.63	65.00	9.77	1177
	8.84	83.00		

Polystyrene K = 1.15 x 104; DHBP-1,4-BD = poly[(2,4-dihydroxy benzophenone)1,4-butylene].

Table 5. Cumulative weight loss data of the polymeric ligand and its polychelates at various temperature.

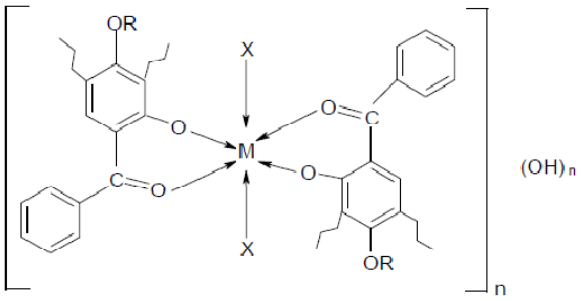
Compound	100 (°C)	150 (°C)	200 (°C)	250 (°C)	300 (°C)	350 (°C)	400 (°C)	450 (°C)	500 (°C)	550 (°C)	600 (°C)
(DHBP-1,4-BD)n	0.42	0.53	0.90	2.74	12.93	19.13	24.70	33.70	44.90	59.10	68.20
[La(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.20	2.85	10.40	23.16	30.31	32.10	35.06	37.09	40.11	47.90	50.10
[Pr(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.79	2.89	9.88	17.98	26.64	28.19	32.10	34.10	39.10	45.03	49.00
[Nd(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.96	2.30	9.59	16.65	20.12	24.09	28.12	31.10	34.40	38.17	42.10
[Sm(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.30	2.86	9.30	15.10	19.65	26.10	32.40	35.10	39.10	46.77	55.23
[Gd(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.99	2.20	9.98	14.84	20.19	27.19	30.10	33.19	38.45	46.49	53.10
[Tb(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.26	2.30	12.75	17.98	24.16	28.90	32.18	34.90	39.45	40.10	41.48
[Dy(DHBP -1,4-BD)$_2$ $(H_2O)_2$]n	1.42	2.19	10.16	17.09	25.16	29.19	33.12	35.19	37.29	39.10	42.19

DHBP-1,4-BD = poly[(2,4-dihydroxy benzophenone)1,4-butylene].

6. Electronic spectra and magnetic measurements

The electronic spectra of all the polychelates exhibited two additional bands in the region 280-290 nm and 450- 460 nm. The first band occurring in the spectra of the polymeric ligand, is assigned to the types $\pi \rightarrow \pi_1^*$ and $\pi \rightarrow \pi_2^*$ transitions [21]. The second band in all the polychelates is assigned to the polymeric ligand Ln(III) transition. The La(III) polychelates were found diamagnetic in nature as expected for six coordinated octahedral geometry. The electronic spectra of Pr(III), f^3, polychelates exhibits absorption at 22,250, 21,000, 20,620, and 16,720 cm^{-1}, assigned to $^3H_4 \rightarrow {}^3p_2$, $^3H_4 \rightarrow {}^3P_1$, $^3H_4 \rightarrow {}^3p_0$ and $^3H_4 \rightarrow {}^1D_2$ transitions of Pr(III) in an octahedral environment, due to the large crystal field with magnetic

moment 3.70 BM. The Nd(III) polychelates are paramagnetic as expected for 4f system. Bands were obtained at 19,210; 17,200; 13,250; and 10,222 cm^{-1} for $^4I_{9/2} \rightarrow {}^2G_{9/2}$, $^4I_{9/2} \rightarrow {}^2G_{5/2}$, $^4I_{9/2} \rightarrow {}^2S_{3/2}$, and $^4I_{9/2} \rightarrow {}^4F_{5/2}$ transitions of Nd(III) in the octahedral geometry. In addition the bands at 24,720; 23,800; and 24,450 cm^{-1} for polychelates are assigned to $^4H_{5/2} \rightarrow {}^4F_{9/2}$, $^4H_{5/2} \rightarrow {}^6P_5$ and $^4H_{5/2} \rightarrow {}^4I_{11/2}$ transitions of Sm(III) in an octahedral geometry due to the large crystal field splitting and all the polychelates are paramagnetic in nature. The magnetic moment 1.75 BM is obtained as expected. The Gd(III) and Tb(III) polychelates were found paramagnetic in nature 7.89 BM and 9.52 BM as expected for the six coordinated octahedral polychelates. The electronic spectra of Dy(III) f10 polychelates exhibit absorption at 28,901 cm-l assigned to $^6H_{15/2} \rightarrow {}^6H_{115/2}$ transition of Dy(III) in the octahedral geometry due to large crystal field splitting. From all the above study the proposed structure of polychelates is shown in Scheme III.



Scheme 3. proposed geometry of polychelates

M=La^{III}, Pr^{III}, Nd^{III}, Sm^{III}, Gd^{III}, Tb^{III}, Dy^{III}

X=H_2O R=H

Table 6. Water content at 25oC and cumulative weight loss data of the polymeric ligand and its polychelates at 100 oC, 150 oC, and 200oC.

Compound	H_2O at 25 (°C)		Found					
			100 (°C)		150 (°C)		200 (°C)	
	(g)	(%)	(g)	(%)	(g)	(%)	(g)	(%)
[La(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	36.00	4.89	8.83	1.20	20.97	2.85	76.54	10.40
[Pr(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	36.00	4.87	13.21	1.79	21.32	2.89	72.91	9.88
[Nd(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	36.00	4.85	14.54	1.96	17.06	2.30	71.15	9.59
[Sm(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	36.00	4.81	9.72	1.30	21.39	2.86	69.56	9.30
[Gd(DHBP -1,4-BD)$_2$	36.00	4.76	15.02	1.99	16.61	2.20	74.34	9.98

$(H_2O)_2]n$								
[Tb(DHBP -1,4-BD) $_2$ $(H_2O)_2]n$	36.00	4.76	9.52	1.26	17.38	2.30	96.36	12.75
[Dy(DHBP -1,4-BD) $_2$ $(H_2O)_2]n$	36.00	4.73	10.79	1.42	16.64	2.19	77.21	10.16
DHBP-1,4-BD = poly[(2,4-dihydroxy benzophenone)1,4-butylene].								

[D] Antimicrobial activity

The bacterial strains of *Escherichia coli*, *Bacillus substilis*, *Staphylococcus aureus* and Yeast strain *Sanccharomyces cerevisiae* were tested with the polymeric ligand and their polychelates. The effect of the compound in the growth media were investigated by standard microbiological parameters. The concentration of the compounds was kept at 500 ppm during the experiment. The bacterial culture was maintained on Nagar (N-broth, 2.5 % w/v agar). The yeast culture was maintained on MGYP in 3 % (w/v) agar agar, malt extract 0.3 % (w/v), glucose 1.0 % (w/v), yeast extract 0.3 % (w/v) and peptone 0.5 % (w/v) in distilled water and the pH was adjusted to 6.7-7.3. All were subcultured every fortnight and stored at 0-5 ^{O}C.

[E] Media Composition

For the growth and test of bacteria and yeast, the N-broth and MGYP media were used. The composition used is as shown below. N-broth: Peptone 0.6 % (6.0 g), NaCI 0.15 % (1.5 g), beef extract 0.15 % (1.5 g) were dissolved in l L distilled water and pH was adjusted to 6.7-7.3. MGYP: Malt extract (3.0 g), glucose (10.0 g), yeast extract (3.0 g) and peptone (5.0 g) were dissolved in l L distilled water and pH was adjusted to 5.5.

[F] Inoculum preparation

Bacterial and yeast cultures, a loop of cell mass from pregrown slants was inoculated into sterile N-broth tubes containing 15 mL medium and incubated on a shaker at 150 rpm and 37°C for 24 h, to obtain sufficient cell density (i.e., 1 * 108 cells/mL).

[G] Screening of compounds for their antimicrobial activity

Antimicrobial activity was checked by the agar diffusion method [22]. Sterile, melted N-agar was poured into a sterile empty Petri plate and allowed to solidify.

A ditch was prepared with the help of a sterile scalpel on opposite ends, with one for control (solvent without compound) and the other for the test sample. The pre-grown cultures were streaked parallel from one ditch to another. Each ditch was filled with respective components dissolved in DMSO at concentrations ranging from 50 ppm to 1000 ppm. Then after, the plates were transferred into refrigerator for 10 min to allow the samples diffuse out from the ditch and into the agar before organisms start growing followed by incubation at 37°C for 24 h. Next day the distance in millimeter (mm) from the ditch was measured as a

parameter of inhibition. The polymeric ligands and their metal complexes

were studied for their antimicrobial activity against standard bacterial strains of *Escherichia coli*, *Bacillus substilis*, *Staphylococcus aureus* (bacteria) and *Sanccharomyces cerevisiae* (yeast). The compounds were tested at different concentrations ranging 50-l000 ppm to find out the minimum concentration of the ligand and the polychelates, which inhibits the microbial growth. The minimum concentration of 500 ppm was found. The inhibition of growth from the ditch was measured in millimeter (mm) and the results are shown in Table 7. The polymeric ligands were found biologically active and their polychelates showed significantly enhanced antibacterial activity against one or more bacterial species, in comparison to the uncomplexed polymeric ligands. It is found that chelation tends to make the ligands act as more potent bactericidal agents

than the parent ligand. The increase in activity is due to formation of a chelate. It is suggested [23] that, in the chelate, the positive charge of the metal is partially shared with the donor atoms of the ligands and there is π- electron delocalization over the whole chelate ring. This, in turn, increases the lipophilic character of the metal and favours its permeation through the lipoid layers of the bacterial membrane. Besides this, other factors may also influence the antimicrobial activity. It is observed that diamagnetic as well as paramagnetic nature is equally effective as antibacterial and antiyeast agent. This property is increased by nearly more than 25% in polychelates. Other factors such as stability constant, molar conductivity, and solubility are also responsible for increasing the antimicrobial activity of
the polychelates.

Table 7. Antimicrobial activity data of the polymeric ligand and its polychelates.

Ligand / Polychelates	Microbial species			
	E.coli	*B.substilis*	*S. aureus*	*S. cerevisiae*
(DHBP-1,4-BD)n	+	+	+	+
[La(DHBP -1,4-BD)$_2$ (H_2O)$_2$]n	+++	+++	+++	+++
[Pr(DHBP -1,4-BD) $_2$ (H_2O)$_2$]n	+++	+++	+++	+++
[Nd(DHBP -1,4-BD) $_2$ (H_2O)$_2$]n	+++	+++	+++	+++
[Sm(DHBP -1,4-BD) $_2$ (H_2O)$_2$]n	+++	+++	+++	+++
[Gd(DHBP -1,4-BD) $_2$ (H_2O)$_2$]n	+++	+++	+++	+++
[Tb(DHBP -1,4-BD) $_2$ (H_2O)$_2$]n	+++	+++	+++	+++
Control (DMSO)	-	-	-	-

DHBP-1,4-BD = poly[(2,4-dihydroxy benzophenone)1,4-butylene]. Inhibition diameter in mm (% inhibition); +: 6-10 (27 - 45%); ++: 10-14 (45- 64%); +++: 14-18 (64-82%); ++++: 18-22 (82-100%). Percent inhibition values are relative to inhibition (22 mm) with 100% inhibition; _: No inhibition

[H] Conclusion

On the basis of elemental, IR, thermogravimetric, UV-visible and ^{1}H NMR spectra, magnetic properties, and vapour pressure osmometry study the structure of the complex has been proposed.. All the polychelates of lanthanides (III) with the polymeric ligand shows good antimicrobial activity compared to free polymeric ligand. It is found that chelation is more effective for ligand to act as more potent bactericidal agents. The thermal stability of polychelates is less than the polymeric ligand.

References

[1.] Arimoto F.S., HavenA.C., Derivatives of dicyclopentadienyliron, *J. Am. Chem. Soc.*, **77**, 6295-6397, 1955.

[2.] Joshi J.D., Patel N.B., Patel S.D., Ion-exchange study of poly [(2,4-dihydroxy benzophenone)propylene]resin and its polychelates: Synthesis, characterization. *J. Macro. Molecular Sci. Part A, PAC.*, **43**, 1179-1188, 2006.

[3.] Mizuta T., Onishi M., Miyoshi K., Photolytic ringopening polymerization of phosphorus–birdge. 1: Ferrocenophane coordinating to an organometallic fragment**,** *Organometallics*, **19**, 5005-5009, 2000.

[4.] Rivas B L., Maturana H.A., Molina M.J., Gomej- Anton M.R., Rosa M., Pierola I.F., Metal ion binding properties of poly (N-vinylimidazole) hydrogels, *J. Appl. Polym. Sci.*, **67**, 1109, 1998.

[5.] Tusa H., Paavola A., Harjula R., Letho J., 8th Int. Conf. of Radioactive Waste Management and Environmental Remediation, **3**, 42, 2001.

[6.] Orazzhanova L.K., Yashkarova M.G., Bimendina L.A., Kudaibergenov S.E., Binary and ternary polymerstrontium complexes and the capture of radioactive strontium-90 from the polluted soil of the Semipalatinsk Nuclear Test site, *J. Appl. Polym. Sci.,* **87**, 759-769, 2003.
[7.] Atia A.A., Donia A.M., Elwakeel K.Z., Selective separation of mercury (II) useing a synthetic resin containing amine and mercaptan as chelating groups, *Reacti. Funct. Polymer*, **65**, 267-276, 2005.
[8.] Jacob A.M., Yizhak M., *Ion-Exchange and Solvent Extraction*, 13th Ed., Marcel & Dekker Inc., New York, 1997.
[9.] Geckeler K.E., Rongnong Z., Reaction products of amino or amide group containing polymer with compounds containing functional and linking groups, Ger. Offen. DE , 4227019, 1994; Chem. Abstr., **121**, 10302f, 1994.
[10.] Alelah A., Moet A., *Functionalised Polymers and Applications*; Chapman and Hall, London, 93, 1990.
[11.] Vankrevelen D.W, New developments in the field of flame-resistance fibers, *Angew. Makromol. Chem.*, **22**, 132, 1972.
[12.] Dentini M., Santis P., Vardin A., Formation properties and structures of bis(O-hydroxybenzylideneamine) copper(II) chelates of polypeptide ligands, *Macromol. Chem.*, **175**, 327, 1974.
[13.] Patel M.N., Patel J.B., Chelateing polymers of phenolic resin, *J. Macromol. Sci. A Chem.*, **19**, 193-199, 1983.
[14.] Nho Y.C., Park J.S., Jin J.H., Antibacterial activity of sulfonated styrene-grafted polypropylene fabric and its metallic salt, *J. Macro. Molecular Sci. Part A, PAC,* **36**, 731 -740, 1993.
[15.] Jayakumar R., Rajkumar M., Nagendran R., Nanjundan S., Synthesis and characterization of metal-containing polyurethanes with antimicrobial activity, *J. Appl. Polym. Sci.*, **85**, 1194 - 1206, 2002.
[16.] Belfiore L.A., Curdie M.P. M., Das P.K., Macromolecule-metal complexes: Ligand field stabilization and thermophysical property modification. *Polymer*, **42**, 9995 - 10006, 2001
[17.] Nursen S., Ebru K., Bekir S., Aulin O., Synthesis of some polymer-metal complexes and elucidation of their structures, *J. Macro. Molecular Sci. Part A, PAC*, **43**, 1227-1235, 2006.
[18.] Silverstein R.M., Webster, F.X., *Spectrometric Identification of Organic Compounds,* 6th Ed., John Wiley, New York, 1998.
[19.] Eliassi A., Modarress H., Water activities in binary and ternary aqueous system of poly(ethylene glycol), poly(propylene glycol) and dextran, *Euro. Polym. J.,* **37**, 1487-1492, 2001.
[20.] Nikolaev V.A., Logvinenko L.T., Myachina L.T., *Thermal Analysis*, Academic; press New York., 779, 1969.
[21.] Kriza A., Reiss A., Florea S., Carproin T., Studies on complexes of cobalt(II), nickel(II), copper(II), zinc(II) and cadmium(II) with Schiff base derived from 3-aminodibenzofuran and salicylaldehyde, *J. Ind. Chem. Soc.*, **77**, 207-208, 2000.
[22.] Stanier R.Y., *Introduction to the Microbial World,* 5th Ed., Prentice Hall, N.J., 16-20, 1986.
[23.] Chohan Z. H., Kausar S., Synthesis, characterization and biological properties of tridentate NNO, NNS, and NNN donor thiazole derived furnyl, thiophenyl and pyrollyl Schiff bases and their cobalt(II), copper(II), nickel(II) and zinc(II) metal chelates, *Met.- Based Drugs*, **7**, 17-22, 2000.

Studies on the use of Coconut Fibres as Carrier for Hydrocarbon Degrading Microbes in Remediation of Petroleum Polluted Soil

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Abstract

This study had as its objective to investigate the characteristics of coconut fibre, from the fruit disposed in the market place at Effurun, Delta State Nigeria to check the viability of application of the fibre as carrier for hydrocarbon degrading microorganism. The samples of the coconut fibre were collected, ground, macerated, sieved and stored. The particle size, available phosphorus, nitrogen content and moisture content of the coconut fibres were determined. The results showed that the coconut fibres have potential related to other natural fibers studied in literature, to be used as carrier for hydrocarbon degrading microorganisms in remediation of petroleum polluted soil.

Keywords: *Cocusnucifera, characterization of coconut fibre, hydrocarbon degrading microorganism, bioremediation.*

1.0 Introduction

In the Niger Delta area of Nigeria there has been several reported cases of oil spills which have led to the contamination of available land for arable farming. The oil exploration, producing and processing companies attempts in the past to clean and treat the contaminated soil have not yield the required result. The methods adopted are usually not friendly to the environment after treatment. However, due to the raise of environmental problems emerged from the processing or discard of petroleum and its products, there is the need to look for biodegradable and renewable raw materials (Ahmedna, et al, 2000).

In pursuance for new materials that could be used as an effective hydrocarbon degrading agent with little or no environmental problems, hence the interest in research for the development of compounds that use natural fibers as alternatives to replace products that damage the environment, (Agiri, et al., 2011)

The use of natural fibres is associated to the factor that they are biodegradable, less abrasive and have a low cost related to the synthetic fibres (Leite, 2010). The coconut fibres come from renewable sources, originating from the food industry and agricultural waste in the tropical countries, where the coconut water is consumed and the endosperm (edible coconut flesh) is used as food condiments. Coconut fibre is disposed indiscriminately and constitute nuisance to the environment. The purposeful use of coconut fibre collaborates in the reduction of solid waste that is issued in the environment (Harries, H. 1997).

Coconut fibres are already applied in the industry and agriculture, however the applicability of the fibres of the coconut bark is somewhat limited due to the high moisture of the barks (85%), and the fibres characteristics do not favour certain applications that are often employed with the dry coconut fibres (Tam, M. 1999). There are little or no reported cases of its use in the field of hydrocarbon degrading process. .Its use by the fibers finishing industries is nothing because of the lack of knowledge on its properties (Rosaetal., 2001).

The coconut fibres are lingo cellulosic materials collected from the coconut meso carp, the coconut fruit (Cocusnucifera) mainly grown in the tropics. Celia, et al., (2013) quoting Leiteetal.,(2010) stated that the coconut fibres have hardness and mechanical resistance due to the high lignin, which also serves as a protection for the tissue against the action of

microorganisms. Therefore, the characteristics of the coconut fibres increase its possibilities of use in bioremediation, for the rigidity provided by the lignin gives a good resistance. Another important element found in these fibers is the preservation against the bacteria attacks, for the lignin has a high natural preservation towards other natural fibers already studied in literature (Martins et al, 2013).

The following reasons were given for selecting these agriculture harvest bye-products as local cellulosic materials to serve as carriers: The agriculture harvest bye-products selected are all available in large abundance locally. It is believed that the selected coconut fibres will not serve as nutrient source for the microorganisms thus helping to prolong the shelve lives of the immobilized microorganisms. The coconut fibres are easily biodegraded thus will not constitute waste problems after the microorganisms are spent, (Agiri, et al, 2011).

According to Wladyka et al., (2009), there are many general advantages of coconut fibres such as, being mooth proof, resistant to fungi and rot, provide excellent insulation against temperature, not easily combustible, flame retardant, unaffected by moisture and dampness, tough and durable, resilient spring back to shape even after constant use, totally static free and easy to clean.

2.0 Materials and methods

2.1 Collection of coconut fibre

Sample of coconut fibre husks were collected indisposal areas of market place, in the city of Effurun, Delta State. Coconut fibre was obtained from the fibrous husk (mesocarp) of the coconut (Cocosnucifera) fruit.

2.2 Size reduction

The individual fibre was pulled out from the husk and the residue was cut with knives then further reduced in size by use of scissors into un-equal size particles. The cuttings were then sun dried for a period of tendaysat about 30°C and 65% relative humidity.

2.3 Dust thermal treatment

The coconut fibre was heated at 80°C for 24 hours for proper drying and to eliminate the microorganisms

2.4 Trituration

Theresi due obtained was cut by a roll of fixed knives, which shave the barks, and then goes through fixed hammers that a responsible for the product crushing.

2.5 Coconut fibre sieving

The brown colour powder was sieved through 0.80 mm, labeled Coconut Fibre (CF) and stored in a plastic container at room temperature in the laboratory.

2.6 Characterization of the coconut fibre

The coco nut was characterized for its water content, nitrogen content, phosphorus content and pH.

2.7 Water content determination (oven drying method)

The water content also called the natural moisture content is the ratio of the weight of water to the weight of the solids in a given mass of the material. This ratio is usually expressed as percentage. A crucible, previously cleaned and oven dried, was weighed (W1). The crucible was then filled with the dried meal of the coconut fibres, and weighed (W2). The crucible containing the coconut fibres was then kept in an oven at a temperature between 105°C to 110°C for 24 hours. The final constant weight (W3) of the container with the dried sample were then determined. The water (moisture) content W (%) was determined from the relationship:

$$\text{Water (moisture) content W (\%)} = [(W2-W3)/ (W3-W1)] \times 100$$

The result of the determination of water content is presented in Table 1.

2.8 Determination of total nitrogen (regular micro-kjeldahl method)

2.00 g of the ground coconut fibres was weighed. 9 ml of Conc. Sulphuric acid was added and the mixture was gently heated on a hot plate until white fumes was observed. It was allowed to cool, filtered and the filtrate was made up to 100 ml in a volumetric flask. 25 ml of the digest was taken from the flask and made up to 50 ml with distilled water. 5 ml of 12 M potassium hydroxide was added and the solution was filtered. 25 ml of the filtrate was taken and 1 ml of 10% sodium tartarate and 5 ml of Nessler's reagent were added. A blank sample with distilled water as the test sample was also prepared. Sample was allowed to stand for 15 minutes for colour development. Absorbance was read at 460 nm with a direct reading spectrophotometer (Hach Direct reading 2000 Spectrophotometer). The results are presented in Table 1.

2.9 Determination of phosphorus (ascorbic acid method)

1g of the dried and ground coconut fibres was weighed into a 250 ml conical flask and 4 ml of Perchloric acid, 2 ml of concentrated nitric acid and 2 ml concentrated Sulphuric acid was added in a fume chamber. The mixture was heated on a hot plate until dense white fumes was observed. It was then heated from medium to high heat for 30 seconds and then allowed to cool. 50 ml of distilled water was then added and the solution was boiled for 30 seconds. On cooling the solution was filtered with a Whatman No 42 filter paper and made up to 100 ml in a volumetric flask. 0.2112 g of ascorbic acid was weighed into a beaker and Phosphate reagent B was prepared by adding 40 ml of Phosphate reagent A to the Ascorbic acid. To 5 ml of the digest was added 10 ml of distilled water, 4 ml of reagent B and made up to 25 ml with distilled water. A blank with distilled water as the test sample was similarly prepared. Both were allowed to stand for 1 minutes for colour development and absorbance was read at 882 nm with a direct reading spectrophotometer (Hach Direct reading 2000 Spectrophotometer). The results of the determinations are presented in Table 1.

3.0 Results and discussion

3.1 Determined values of water content, available phosphorus, nitrogen content

For many cellulose materials, the water content, total nitrogen and available phosphorus are extremely important indices for establishing the relationship between the way the material behaves and its properties. The consistency of a fine cellulose material largely depends on these parameters. The determined water content of coconut fibres value of about 10.92% allows for effective adhesion of the microorganism without rotting. The determined values of available phosphorus and Nitrogen content of 14.65 mg/kg and 86.13 mg/Kg respectively are considered to be of importance in the condition for effective bioremediation process.

Chemical composition

The value of the total lignin present in the coconut fibres is approximately 44% according to the researched literatures. The high lign in favours the fibres flexibility and gives them a good resistance and a protection against microorganism attacks, crucial aspects for the use as carrier for hydrocarbon degrading microorganism.(Celia et al, 2013).

Optical microscopy

The optical microscopy consisted in analyzing the fibres surface, providing an image produced by the interaction between light and fibre, with a wide field of observation. Figure2 shows the optical microscopy done on the surface of the green coconut fibers, with a magnification of 20 times, and Figure 3 shows the same fibres with a magnification of 32 times. The superficial aspect is shaped like a "twisted shoelace", which gives the fiber a better rigidity.

4.0 Conclusion

The use of agricultural waste product could replace synthetic ones as carriers for hydrocarbon degrading microorganisms. The reported use of material such detergent, chemicals which are pollutant themselves and come from non-renewable raw materials are of grave danger to the environment. There is a trend in using natural materials in the hydro carbon degrading process because of its environmental friendliness problems created during the bioremediation processes. In this sense, the coconut fibres are being studied for the use as potent carriers for the hydro carbon degraders. From the obtained results, we can conclude that the high lignin in the coconut fibres provides a good flexibility and a natural protection against micro organism attacks. The pursuit for sustainable materials is important to application in sectors that need renewable raw materials and need to reduce their environmental pollution.

Appendix



Fig. 1 Coconut Fibre (0.80 mm)



Fig. 2 Coconut fiber (magnification 20x)

Source: Celia et al 2013



Fig. 3 coconut fibres



Fig. 4 Unequal sizes of coconut fibres

Table 1: Determined Values of Water Content, Nitrogen and available Phosphorous

Parameters	**Coconut Fibre**
Water Content, %	10.92
Available Phosphorus, mg/Kg	14.65
Total Nitrogen, mg/Kg	86.13
Naturalfiber	**Total lignin (%)**
Mature coconut	48,3 ± 1,9
Green coconut	44 ± 1,0
Banana tree	16,8 ± 1,0
Jute	15,9 ± 0,5
Sisal	12

Source: Celia et al, 2013

References

[1.] Agiri, G. O., Akumagba, P. E., Adimula, H. A., and Edoga, M. O. (2011) Isolation and Characterization of Petroleum Hydrocarbons Degrading Bacteria from Soils around Warri, Delta State, Nigeria.

[2.] Ahmedna, M., Marshall W. E, Rao R .M, (2000) Production of Granular Activated Carbons from select Agricultural by products and Evaluation of their Physical, Chemical and adsorptive properties. Bioresource Technol. 71:113-123 .

[3.] Celia, R. C., Regina, A. S., Julia, B. R., Jorge, B. (2013) Mechanical Characterization of Green Coconut Fiber for Application in the Footwear Industry. International Journal of Arts and Commerce, Vol. 2, No. 9
[4.] Harries, H.(1997) Coconut Palm Encyclopaedia of Food Science Food Technology and Nutrition. 3rd Edition, Harcourt Brace Jovanovich Publishers.
[5.] Martins, A. P., Watanabe, T., Silva, P. L R., Borelli, C., Marcicano, J. P. P., and Sanches, R. A., (2013).Use of YoungNutCoirFiberforTextileApplicability,RiodeJaneiro:Redigev.4,n.2.
[6.] Saville, B.P., (2007).Physical Testing of Textiles, Cambridge: The Textile Institute Woodhead Publishing Limited.
[7.] Tam, M., Antal M (1999).Preparation of Activated Carbons from Macadamia nut shell and Coconut shell by air activation. Ind. Eng Chem. Res. 38: 4268-4276

WI-FI Path Finding for Indoor Localization Using 802.11 Standards

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Abstract

Wi-Fi performs a figurative role for interior surroundings in localization lacking of any supplementary procedure or tools by means of IEEE 802.11principles. User's site is planned on the foundation of Received Signal Strength Indicator (RSSI) commencing of Access Points (AP's) contained by coverage vicinity through using Revisiting Hata Okumara Formula model and method adopted is Trilateration. Tentative outcomes concluded that results are improved approximately concerning about 1.1m referenced to preceding work using the similar practice. Statistical figures shows upgrading of outcome in efficiency and being exact enough to situate user surrounded by 1m or lesser in an enclosed atmosphere.

Keywords*: Wireless Fidelity, Signals Strength, Access Points*

I Introduction

Wi-Fi 802.11g is a standard that offers an efficient data rate up to 54Mbps that operates at 2.4GHz having a toward the rear compatibility with the 802.11b procedures. Location of the movable user could be calculated by means of the Received Signal Strength Indicator (RSSI) from the Access Points (APs) or the objective. The major and minor milestone to be achieved all over the research are, the primary objective of this study is to adopt a method to provide a flexible as well as scalable result that will supervise and investigate the position of the things in an indoor environment with high accuracy.



Fig. 1 Structure of Indoor positioning User Cases

(Source: http://www.gpsworld.com/wireless localization/indoor-positioning)

II Related Work

In the preceding decade or so, wireless local area networks (WLANs) gained a lot of recognition. “Wi-Fi Alliance products that are based on IEEE standards (802.11 a, b, g, n)” .Indoor environment deals with a problem of localizing the objects. Wireless sensor networks are use to examine the physical, natural or environmental circumstances such as temperature, sound, humidity, vibration, pressure, volcano areas, Navigation, forest fire places, and humidity so on these networks are named as emergency sensor networks (ESN) **[1].** Wireless Localization technology has a promising prospect impact to serve in an indoor environment **[2].** This application include real time tracking things, objects, emergency based detections, incident monitoring, distant health care, telemetry system.

GPS is a well-liked technology in considering outdoor environment **[3]** GPS provide satellites based positioning at current which is extensively used in the globe. GPS restrictions occur in an indoor environment as objects or targets cannot be detected in this scenario. A person spends most of the moment in indoor environments; indoor tracking is necessary to fulfill the requirement for tracking in an indoor localization technology that has been deployed **[4]**. Complication for indoor environments include some of the challenges i.e. NLOS (Non Line Of Sight), absorption, reflection, scattering, fading, refraction, multipath effect, attenuation, noise interference and disturbances like walls, concrete, cupboards, glass and human beings too. But these influences result in the weaknesses for the signals, these effects can’t be abandoned. Several review papers are for indoor localization environments **[5][6][7].**

A wireless set of connections consists of many types (GSM, WLAN, Zigbee, Wi-Fi, UMTS, EDGE, LTE and WiMAX) **[8].** Wi-Fi technology is useful in indoor environment for the reason that as for considering its ease of access and charge which is very little. Accurateness and Precision are the essential main factors in an indoor localization, limited signals id degradation in accuracy of positioning **[9][10]**. Indoor positioning finding is attained by using Wi-Fi signal strengths (SS), and formulae for localizing in user’s position. Wi-Fi signals are based on radio waves where travelling of signals are fully dependent upon its frequency **[11].** Signals are transmitted through Access Point’s (APs) in omni-direction regarding their specific signal strengths. Wireless router can cover an average region of about 35 meters i.e. (125 feet).

Indoor environment face a lot of troubles due to which limitation in the power of the signal occur owing to path loss since it become weaker as for as distance is increased from the origin**[12].** Loss is associated to the dimension of material, focusing on its width; attenuation cause due to glass is superior to brick walls **[13].**These factors have a significant impact particularly by means of the methods to determine distances by calculating the signal strengths **[14].**By experiment it is accomplished that with the occurrence of users the signal strength is distorted **[15].** The signal strength is therefore weakening owed to the humans in an environment. The radiations are up to some extent absorbed as human beings contain water in their bodies in addition to this attenuation occurring in the signal strength. Position of a mobile tool with signal strength plot relates measurements with a SS plot. Two approaches are there for measurement corresponding either Deterministic **[16]** or else by Probabilistic **[17]** Localization is a main feature in deploying Wireless Local Area Network (WLAN) **[18].**

III Methodology

Localization is achieved in indoor environment by means of the already accessible infrastructure within a campus or building. This experiment consists of three APs. The Access Points are situated as more area must be enclosed. The routers are initially configured by 802.11 Wi-Fi standards. During configuring the routers it must be notice that for each AP the guide must be special so that interference may not occur and the RSSI provided by AP must be exact. Most important of alla client server application is programmed in C sharp Language. The cause behind developing this appliance is that we can’t find the RSSI values of the user at our server. This value is only accessible at the user end or client system.

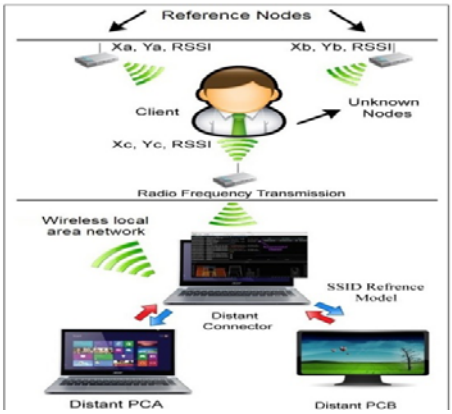

Fig. 2 System Model

Client side consists of wireless networks names within which all of the available and working Access Points are revealed in the chart with reference to each AP, signal strengths for each Access point is also determined. It will present a page which includes names of all the existing Access point; however in this testing we will require just three Access points, so there is a building block to filter the networks that is our ideal motive. The user must be associated with a primary node Access point. The RSSI values of the primary node Access Point, inferior node AP1 and inferior node AP2 is presented. At this moment these values of Received Signal Strength Identification must be available on our main server to locate out the distance estimation of the unknown user or target from each of the nearby Access Points. The function of the server is that it starts monitoring the information that what is send by the user side which includes all of the RSSI values about the desired Access Points and their individual received power which are taken in dBm.

After these fundamental values we are keen into the influences of main obstacles which are from glass, woods, concrete, walls, doors, materials, partitions etc. Generally in such a situation path loss exponent is considered 4 but considering it for free space its value is taken 2, but in our environment there are huge obstacles such as racks, curtains, chairs, computers, tables, sheets, glass, looking into all these compulsory obstacles the value for "n" is taken flanked by (3.5 - 4.0) . Standard deviation (Xa) have values of (2 -4) respectively, however as signal power varies its value so it is set at (3- 5) and value of 20 is considered when there are massive obstacles in the environment. The scaled for dBm factor is taken to be 100 for which the maximum RSSI is used as 100. But as a matter of fact it is not exactly 100 but it is due to the internal system software of the computer or Laptop because it shows us its upper limits which is not an accurate value. Considering empirical constant which is equal to -15 in this case. As in 802.11 standard frequency is 2.4GHz for "n" standard and the value of wavelength (□) by calculation is equal to 0.13.

The most significant formula for finding the distance estimation is Revisiting HataOkumara Model (RHOM) in which the logarithmic distance block is the simplest one [19].

For the values of RHOM Cisco provide us relatively accurate outcome but they are specifically planned for an environment which is ideal and without influences considering obstacles. Distance is calculated by the formula as shown below.

$$D=\frac{1}{10n}\left(P_{TX}-P_{RX}+G_{TX}+G_{RX}-X_a+20\log\lambda-20\log(4\pi)\right) \qquad (1)$$

Through putting the intended values in the above formula user's distance is calculated from each AP.Distance for each APs is shown in lengths that is in meters and respectively in feet's. Outcomes of the distances are calculated from each single one of the Access Points that are shown on a specific plot. The plot is sketched for anAcademia campus that includes rooms, lecture halls, blocks, offices, equipments, library, laboratories and stairs so there is a massive

influence of obstacles. Essentially there are two procedures as a result of which the position of theuser or target can be achieved i.e. Triangulation and Triletaration. But in this experiment the method adopted is Trilateration.

However in Trilateration we work withdistances referring a type of proportions that is used basically for calculating the position of a specific task by using geometry of circles, squares, spheres or triangles [20][21][22][23].

IV Experimental study

Experimental setup basically consists of three Access Points (APs), two laptops or computers. Study is done by Access points which are placed in an area depending upon its coverage area for Wi-Fi in an indoor location which is approximately 35 meters or 125 feet's. APs are positioned at different spaces such that Signal Strength must be greater when received by user equipment. As we have two types of directivity of radiations omnidirectional and directional but taking omnidirectional case signals are lost up to a huge extent as we do not require signals in all directions, so it can't be used for this particular case. To make Signal strength increase we can use of directional antenna with the Access Point for greater intensity or radiations in a specific area.

In our practical phase and deployment scenario, the primary one is Primary AP "sikandar 1" similarly the second is Secondary AP1 "sikandar2" and the third is Secondary AP2 "sikandar 3" that are filtered at the client area. Designed for each AP its Received Signal Strength Identification values are shown in table and its respective Received Power (PRX) values. Determination of the distance is the major part of this experiment. By inserting the value of (PRX) which is found from each Access Point, putting its value in RHOM model D1, D2, and D3 is calculated. Subsequent to distance estimation Trilateration method is used to find out location of the unknown user.

After finding the distancse the values of "i" and "j" are calculated which is found by their specific formula such as,

$$i = x_3 - x_1 \tag{2}$$

And

$$j = y_3 - y_2 \tag{3}$$

When the calculated values of "I" and "J" are determined the last and important step is to calculate the coordinates of the target or user on the map, which basically means calculating its "x" and "y" values. To find out "x" and "y" coordinates following formulae are used.

For x

$$x = \frac{r_1^{\,2} - r_2^{\,2} + d^{\,2}}{2d} \tag{4}$$

Also for y

$$y = \frac{r_1^2 - r_3^2 - x^2 + (x-i)^2 + j^2}{2j} \tag{5}$$

Where:

"d" is the Distance between Primary Access Point and Secondary Access Point.

"r1" is the distance of Primary Access Point that is D1.

"r2" is the distance of Secondary Access Point 1 that is D2.

"r3" is the distance of Secondary Access Point 2 that is D3.

Finally the coordinates of the unknown user or target on the map are resulting its radius are sketched from each Access Point (AP). Unknown user has a location where all the three radii

of circles overlap or cut each other. User position is at a single spot or point so there must be just a single point at which all the radii of circles will intersect each other that is the common point or location amongst all circles from the three Access Point's.

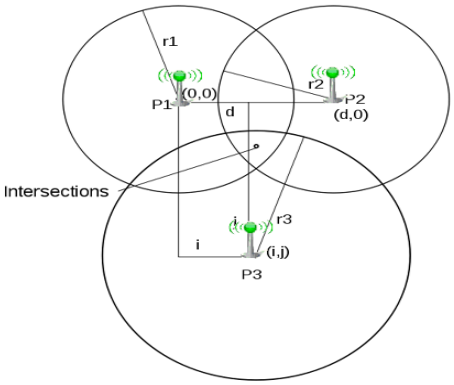

Fig. 3 Trilateration technique for distance estimation

V Experimental results

Distances are determined by (RHOM) formula. The results are founded on the basis of Received Rower (PRX) values which are given below. Total numbers of experiments conducted are 24 some of their calculated values are shown in the table below:

S.No	Received Power from AP's	Distance from AP's	Map Location	Localization (Accuracy)
1	P_{rx1}= -12dBm P_{rx2}= -49dBm P_{rx3}= -52dBm	D_1=1.091m D_2=14.523m D_3=14.633m	X=343 Y=221	0.78m
2	P_{rx1}= -9dBm P_{rx2}= -47dBm P_{rx3}= -53dBm	D_1=0.354m D_2=13.043m D_3=17.843m	X=356 Y=190	0.82m
3	P_{rx1}= -38dBm P_{rx2}= -18dBm P_{rx3}= -31dBm	D_1=11.713m D_2=5.803m D_3=9.133m	X=380 Y=270	0.77m
4	P_{rx1}= -13dBm P_{rx2}= -43dBm P_{rx3}= -52Dbm	D_1=4.143m D_2=12.943m D_3=17.263m	X=362 Y=229	0.79m
5	P_{rx1}= -15dBm P_{rx2}= -48dBm P_{rx3}= -55Dbm	D_1=4.073m D_2=12.73m D_3=17.133m	X=360 Y=226	0.72m
6	P_{rx1}= -17dBm P_{rx2}= -37dBm P_{rx3}= -49Dbm	D_1=4.15m D_2=13.043m D_3=16.06m	X=364 Y=226	0.74m
7	P_{rx1}= -16dBm P_{rx2}= -49dBm P_{rx3}= -58Dbm	D_1=4.10m D_2=13.011m D_3=18.093m	X=355 Y=231	0.63m

8	P_{rx1}= -18dBm P_{rx2}= -48dBm P_{rx3}= -52Dbm	D_1=5.247m D_2=13.143m D_3=16.897m	X=364 Y=221	0.86m
9	P_{rx1}= -12dBm P_{rx2}= -45dBm P_{rx3}= -55Dbm	D_1=4.269m D_2=13.643m D_3=17.467m	X=363 Y=227	0.82m
10	P_{rx1}= -14dBm P_{rx2}= -40dBm P_{rx3}= -52Dbm	D_1=4.147m D_2=11.563m D_3=16.289m	X=365 Y=221	0.73m
11	P_{rx1}= -17dBm P_{rx2}= -52dBm P_{rx3}= -61Dbm	D_1=4.023m D_2=16.694m D_3=17.263m	X=344 Y=210	0.77m
12	P_{rx1}= -16dBm P_{rx2}= -41dBm P_{rx3}= -59Dbm	D_1=4.27m D_2=12.894m D_3=17.298m	X=335 Y=195	0.84m
13	P_{rx1}= -11dBm P_{rx2}= -45dBm P_{rx3}= -55Dbm	D_1=4.03m D_2=12.467m D_3=17.828m	X=363 Y=229	0.76m

Fig. 4 Calculated outcomes of Distances and localization in mapping using 3 AP's.

VI Conclusion

Wireless localization technology has undergone a substantial improvement in the earlier period decades. Wi-Fi based Positioning structure has an imperative part for improving the performance to track in an inside environment lacking the need of specialize positioning procedure. Locality can be achieved by present devices in an indoor environment. Superior adaptation is able to achieve as we gained the data from additional reference points (APs) for any indoor environment. Localization information points as diversity has a unswerving relation with tracking accurateness for unknown targets. Provisioning to Wireless access along with data communication technologies are swiftly enhancing with instant. In recent years, wireless communication has matured enormously. Users are constantly shifting from wired networks toward wireless in homes and office. Wireless access as well provides the magnificence of mobility that is even further smart for mobile users. In this approach we can get better the competence of these services. Localization for open-air system can be achieved easily by means of using GPS. At the start, it was deployed in favor of military purpose and it has a very high exactness in manipulating its targets.

Limitation occurs as soon as the sky is not clear; detecting objective position become almost impractical. GPS has improved results for outdoor surroundings, for indoor situation some additional technology is adopted. The basic purpose of deploying Wi-Fi is its availability, flexibility, mobility, less time, connectivity at a much lesser cost. Special standards for Wi-Fi structure are developed by IEEE 802 operational group out of which 802.11b and 802.11g has develop into a standard for industry that work at 11Mbps and 54Mbps correspondingly for the frequency band of 2.4 GHz which includes the Industrial, Scientific and Medical (ISM)band presented worldwide devoid of requiring any license.

The planned method adopted is to compute location of an unknown user or target in an indoor setting by using Wi-Fi Signal Strengths (SS) that is IEEE 802.11 standards. Experimental study was performed in a university campus building for an indoor environment where influences of obstacles were enormous. The method adopted here is Trilateration. Precise enough for localizing a user within a range of 1m or less.

Innovative research efforts are required to tackle these kinds of issues in the nearby future.

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References

[1] Ambili Thottam Parameswara and Mohammad Iftekhar Husain, "Is RSSI a Reliable Parameter in Sensor Localization Algorithms – An Experimental Study," , USA, 2009.

[2] Da Zhang and Wenhong Zhao, "Localization Technologies for Indoor Human Tracking," in *Future Information Technology (FutureTech)*, 2010, pp. 1- 6.

[3] Binghao Li and Andrew G. Dempster, "On outdoor positioning with Wi-Fi," *Journal of Global Positioning Systems*, vol. Vol. 7, no. No. 1 :, pp. 18-26, (2008).

[4] Holger Linde, "On Aspects of Indoor Localization," August 2006.

[5] Yanying Gu, Anthony Lo, and Ignas Niemegeers, "A Survey of Indoor Positioning Systems for Wireless Personal Networks," *IEEE Communications Surveys & Tutorials*, vol. vol. 11, no. no. 1, pp. 13-32, 2009.

[6] Isaac Amundson and Xenofon D. Koutsoukos, "A Survey on Localization for Mobile Wireless Sensor Networks," *MELT* , no. LNCS 5801, pp. 235-254, 2009.

[7] Hui Liu, H. Darabi, P. Banerjee, and Jing Liu, "Survey of Wireless Indoor Positioning Techniques and Systems," *IEEE Trans. Systems, Man, and Cybernetics, Part C*, vol. 37, no. 6, pp. 1067-1080, October 2007.

[8] Crow BP, Widjaja I, kim JG, and Sakai P, "IEEE 802.11 wireless local area networks," *IEEE Commun Mag*, vol. 35, no. 9, pp. 116-126, 1997.

[9] Stuart Ingram, "UltraWideBand Indoor Positioning: Indoor posi-tioning to match the best satellite navigation performance," no. 2, july 2006.

[10] George Dedes and Andrew G Dempster, "Indoor GPS Positioning: Chal-lenges and Opportunities," *Vehicular Technology Conference, 2005. VTC-2005-Fall. 2005 IEEE 62nd*, vol. 1 , pp. 412- 415, Sept 2005.

[11] Nor Aida Mahiddin, Noaizan Safie, Elissa Nadia, Suhailan Safei, and Engku Fadzli, "INDOOR POSITION DETECTION USING WIFI AND TRILATERATION TECHNIQUE," in *The International Conference on Informatics and Applications* , Malaysia, (2012), pp. 362-366.

[12] Robin Henniges, "Current approches of Wifi Positioning," *SERVICE-CENTRIC NETWORKING*, 2012.

[13] John C. Stein, "Indoor Radio WLAN Performance," Palm Bay, Florida, Harris Semiconductor.

[14] Robin Henniges, "Current approches of Wifi Positioning," , TU-Berlin , Germany, 2012.

[15] K. Kaemarungsi and P. Krishnamurthy, "Properties of indoor received signal strength for WLAN location fingerprinting," in *Mobile and Ubiquitous Systems: Networking and Services, 2004. MOBIQUITOUS 2004. The First Annual International Conference* , USA , Aug. 2004, pp. 14- 23.

[16] Paramvir Bahl and Venkata N. Padmanabhan, "An In-Building RF-based User Location and Tracking System," *INFOCOM - IEEE INFOCOM*, vol. 2, pp. 775-784, 2000.

[17] R Roos, P. Myllymäki, H. Tirri, P. Misikangas, and J. Sievänen, "A Probabilistic Approach to WLAN User Location Estimation," *International Journal of Wireless Information Networks*, vol. 9, no. 3, pp. 155-164, July 2002.

[18] Nattapong Swangmuang and Prashant Krishnamurthy, "Location Fingerprint Analyses Toward Efficient Indoor Positioning," *Pervasive. Computing and Communications, 2008. PerCom 2008. Sixth Annual IEEE International Conference on*, pp. 100- 109, March 2008.

[19] Frédéric EVENNOU and François MARX, "Improving positioning capabilities for indoor environments with WiFi," in *LIAISON*, France, 2006, pp. 35-42.

[20] http://www.globmaritime.com/technical-articles/marine-navigation/general-concepts/9622-trilateration-traverse-and-vertical-surveying.html, 2009, wikipedia search.

[21] http://www.thefreedictionary.com/trilateration, 2003, wikipedia search.

[22] http://www.diracdelta.co.uk/science/source/t/r/trilateration/source.html#.UXvJm6tHI-w,wikipedia search.
[23]http://www.britannica.com/EBchecked/topic/605329/trilateration, 2013, wikipedia search.
[24] Hakan Koyuncu, Hakan Koyuncu, and Shuang Hua Yang, "Comparisons of Indoor PositionEnhancements by Using Mean and KalmanFiltering Techniques," vol. VOLUME 11, no. ISSUE 2, FEBRUARY 2012.
[25] M. Depsey, "Indoor Positioning Systems in Healthcare," *Radianse Inc.White Paper*, 2003
[26] S. Gezici, "A survey on wireless position estimation," *Wireless Personal Communications*, vol. 44, no. 3, pp. 263-282, Feb 2008.
[27] Lassabe F, Charlet D, Canalda P, Chatonnay P, and Spies F, "Predictive mobility models based on Kth Markov models," IEEE int conf on pervasive services, pp. 303–306, 2006.
[28] Deblauwe N, "GSM-based positioning: techniques and applications," in PhD thesis, Vrije Universiteit Brussels, (2008.
[29] Frédéric Evennou, "Advanced techniques and technologies for indoor mobile positioning," Université Joseph-Fourier - Grenoble, 2007.
[30] sBarry McLarnon, "A workshop given at the 1997 TAPR/ARRL Digitial Communications Conference," Ottawa, VHF/UHF/Microwave Radio Propagation: A Primer for Digital Experimenters 1997.
[31] Ambili Thottam Parameswaran, Mohammad Iftekhar Husain, and Shambhu Upadhyaya, "Is RSSI a Reliable Parameter in Sensor Localization Algorithms – An Experimental Study," *Instrumentation and Measurement Technology Conference (I2MTC), 2012 IEEE International*, pp. 935- 940 , 2012.
[32] M. Cypriani, F. Lassabe, P. Canalda, and F. Spies, "Wi-Fi-based indoor positioning: Basic techniques, hybrid algorithms and open software platform," Indoor Positioning and Indoor Navigation (IPIN), 2010 International Conference on, pp. 1- 10, Sept 2010.
[33] Paramvir Bahl and Venkata N. Padmanabhan, "Enhancements to the RADAR User Location and Tracking System," Anand Balachandran , California , February 2000.
[34] J. M. Keenan and A. J. Motley, "Radio coverage in buildings," British Telecom Technology Journal, vol. 8, no. 1, pp. 19–24, June 1990
[35] A. Smailagic and D. Kogan, "Location sensing and privacy in a context-aware computing environment," Wireless Communications, IEEE, vol. 9, no. 5 , pp. 10- 17, Oct. 2002.
[36] Mauro Brunato and Csaba Kiss Kall´o, "Transparent Location Fingerprinting," in Proceedings of Med-Hoc-Net, ITALY, Sep. 2002.
[37] O. Baala and A. Caminada, "WLAN-based Indoor Positioning System: experimental results for stationary and tracking MS," IEEE International Conference on Communication Technology (ICCT'06), pp. 1–4., Nov 2006.
[38] Paramvir Bahl, Padmanabhan N. Venkata, and Anand Balachandran, "Enhancements to the RADAR User Location and Tracking System," Microsoft Research 2000.
[39] G. D. Forney, "The viterbi algorithm," Proceedings of the IEEE, vol. 61, no. 3 , pp. 268 - 278, March 1973.
[40] Roy Want, Andy Hopper, Veronica Falcão, and Jonathan Gibbons, "The Active Badge Location System," in *ACM Transactions on Information Systems*, vol. 40, Cambridge, England, Jan. 1992., pp. 91- 102

Case Study: Personalized self-hypnosis method for Irritable bowel syndrome

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1.0 Identifying Information

Clinical hypnotherapy is proven by many research studies as an evidence-based practice. Hypnotherapy is classified as a complementary therapy which regulated by Ministry of Health in Malaysia. Irritable bowel syndrome (IBS) is a common disorder that many patients suffered in Malaysia. However, there is still lack of practitioner who specialized in IBS and offer effective intervention. According to a recent study (Lindfors el at., 2012), gut-directed hypnotherapy is one of the most effective intervention for IBS related issues and the result able to sustain up to 1 year. However, traditional gut-directed hypnotherapy involves 12 sessions of 1 hour therapy session. This case study will demonstrate the advantages of personalized self-hypnosis method which combine with a brief version of gut-directed hypnotherapy session which only involve 3 sessions. Treatment is tailored for Eric Liu, a male client who is 35 years old and diagnosed with Irritable bowel syndrome by medical doctor.

2.0 Presenting Complains

- Irritable bowel syndrome (IBS) related issues
- Stomach and liver area discomfort
- Diarrhea
- Nervous and anxiety issues
- Concentration issues

3.0 History of presenting issues

Eric Liu reports that he is having IBS problem since 5 years ago after food poisoning incident. He reports to us that medical doctor told him that he is suffering with IBS problem. He reports that he is unable to relax, fear of stomach discomfort problem, and fear of worst things will be happened on him. He always feel stomach discomfort before he ready to go out from the house or he feels anxious. Sometimes, he even went to toilet more than 3 times before he ready to go out from the house.

At work, he faces difficulty in concentration and engage in task due to IBS issues. He finds that he cannot focus and pay attention to others during the conversation. All these problems are bothering him a lot. He wants to improve his quality of life.

During the past month, there is more than 3 times a week that he feels stomach and liver area discomfort. He went to see medical doctor and traditional Chinese medicine practitioner often. However, he remarks that he can't see much improvement after received treatment from them. In recent, he feels that his symptoms become more serious. Thus, he makes a decision to try on neuro-hypnotherapy.

4.0 Behavioural observation

Appearance:
He appears well. Dress in a relaxed clothing style
Behaviour:
Nervousness but friendly.
Willingness to listen.
Speech and language:
He can communicate well. Speech is rapid with long pause
Affect:
He was quite anxious about what was going to happen during the session
Attention, concentration and impulsivity:
He is good in listening and attention skill.
Impatient.

5.0 Summary/recommendations

The initial interview session indicate that he is concern about his IBS issues, anxiousness and life quality.

Based on the initial interview session, the following ideas are suggested to help to deal with his issues, namely:

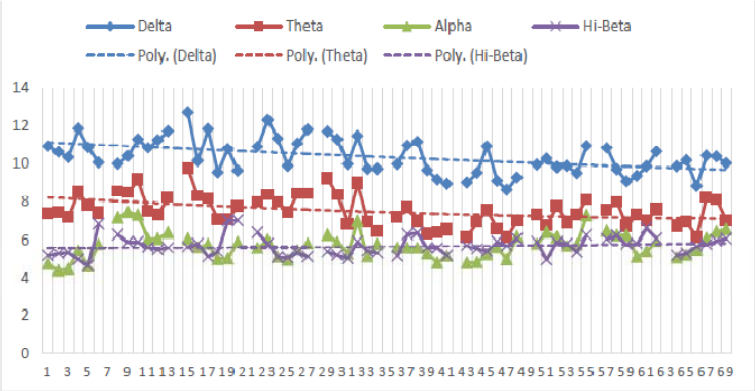
i. Coping skill for anxiousness
ii. Neuro-hypnotherapy (gut directed method) for IBS issues
iii. Personalized self-hypnosis method
iv. Psychoeducation: Macronutrient Mood Therapy

6.0 Therapy session

Neuro-hypnotherapy

i. Session one: Hypnotic suggestibility testing and gut directed hypnotherapy

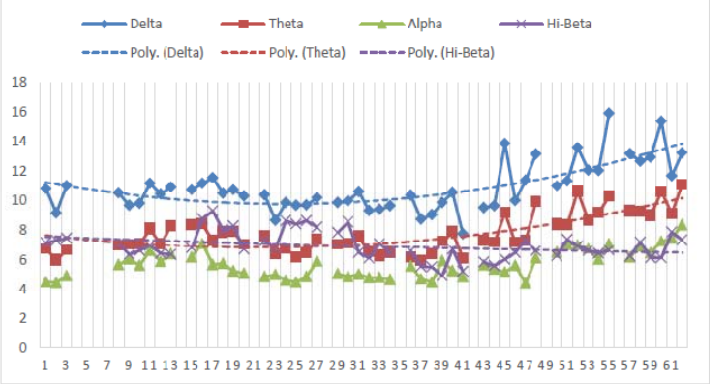
- An individualized self-hypnosis plan that is tailored according to his brainwaves and hypnotic suggestibility testing result is suggested for better therapeutic outcome. Self-hypnosis approach has to be based on his hypnotic suggestibility testing result instead of traditional self-hypnosis techniques.
- His brainwaves show that she is responsive on certain hypnotic suggestion such as gustatory system, imagination learning system and visualization etc.
- Hi-Beta fast brainwaves which are associated with stress, anxiety and tension was remaining low during the session. This could indicate that he is remaining calm during the session. However, there is a cross over in between Alpha brainwave and Hi-Beta brainwave. This could indicate that He was doing his best to pay attention and follow to the therapist's suggestion and instruction.
- Slow brainwaves such as delta and theta was remaining high during the session. The gap between Delta and Hi-Beta brainwaves are considered as big gap. However, the gap between Theta and Alpha brainwaves are not significant big enough. This could indicate that he is in a calm and relaxed mood.



The graph above shows the session on 13th May 2015

Session two: practicing personalized self-hypnosis, coping skill and gut directed hypnotherapy

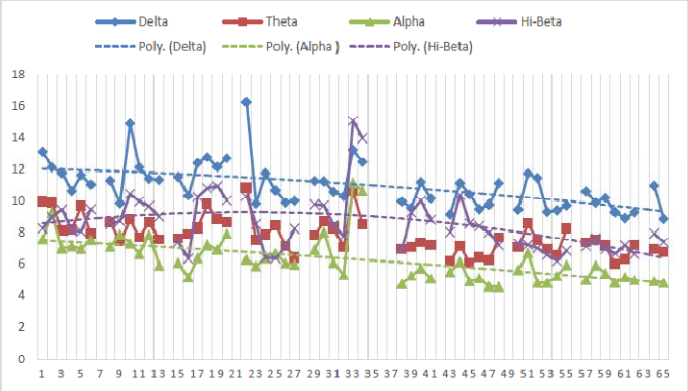
- Hi-beta fast brainwaves were higher than theta and alpha at the first 4 period. This could indicate that he was paying attention to the suggestion and his mind is actively engage in the given task.
- Slow brainwaves such as Delta, Theta and Alpha were keep increasing during the session. This could indicate that he was going into a deeper trance state.
- Another clue that he went into a deeper trance state is the gap between alpha and theta was becoming bigger during the session. From the graph, we can notice that the theta is higher than alpha. This could indicate that client was experiencing a subconscious mental activities.



The graph above shows the session on 19th May 2015

ii. Session three: Gut directed hypnotherapy and self-hypnosis rehearsal

- The first 5 period, client has learned how to experience the tense as well as calm feeling. Thus, tension associated Hi-Beta was increasing during first 5 period.
- After 5 period, the tension associated Hi-Beta brainwaves start to decrease. Alpha decreased could indicate that his brain stop thinking too much and getting calmer.



The graph above shows the session on 25th May 2015

Remark

Beta brainwaves are associated with cortical cell activity, active and working; fast brainwaves.

Hi Beta brainwaves are associated with stress, anxiety and tension.

Alpha brainwaves are associated with relaxed focus, light trance, calm, intuition, beginning access to subconscious mind, increased serotonin production, not thinking.

Theta brainwaves are associated with dreaming, drowsy and subconscious mental activities

Delta brainwaves are associated with physical healing, sleep, unconscious mind and deep relaxation; slowest brainwaves.

7.0 Therapeutic outcome

Eric Liu reports that he feels a significant improvement after 3 sessions. He reports that although he didn't practice coping skill much, he is still able to relax by practicing the personalized self-hypnosis alone. Now he feels no more worry about worst things will be happened on him and not afraid of his IBS issues. He feels that his stomach discomfort problem becomes mildly and the frequency reduce to the minimum already. The nervous feelings have also significantly reduced after first and second therapy sessions.

Now, he is able to control and even stop himself to go into the washroom repeatedly before he goes out from the house. He found that personalized self-hypnosis method is impressive because he can control the pain and discomfort just by putting his palm over his stomach. He feels that his overall life quality has improved since the first session.

After 1 month follow up, he remarks that he didn't experience any IBS related issues at all. No more Stomach and liver area discomfort.

8.0 Further recommendations

Following the therapy session the most appropriate management of his issues:

i. Nutritional Therapy. This will enable him to stabilize his mood and anxious issues.
ii. Emotional Freedom Techniques. This coping technique can help him to overcome all nervousness and stress related issues.
iii. Personalized self-hypnosis. He should keep practice his personalized self-hypnosis technique to improve his brainwaves and IBS issues.
iv. Counselling session/psychotherapy/hypnotherapy for stress management and mood stabilization.
v. Progressive muscle relaxation therapy

Reference

[1.] Perjohan Lindfors, Peter Unge, Patrik Arvidsson, Henry Nyhlin, Einar Björnsson, Hasse Abrahamsson, Magnus Simrén (2012). Effects of Gut-Directed Hypnotherapy on IBS in Different Clinical Settings—Results From Two Randomized, Controlled Trials Journal: American Journal of Gastroenterology 2012. doi: 10.1038/ajg.2011.340

Learners With Below Average Reading Abilities

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1. Introduction

The purpose of this case study is to serve as a model for educators, family and parents. The study is focus not only on children's reading or level of intellectual but also outline an intervention plan that can be implemented by educators and family members. Further the intervention strategies are to assist a bilingual learner that experiences a low average reading ability.

2. Background and demographic information

Lee is a seven-year old female learner at Norkem Park Elementary girl's school. Currently she is in the second grade. Lee is related to the Africa ethnic group and speaks both Afrikaans and Zulu. Zulu is regularly speaking at home amongst her friends and family, however she frequently speaking English, and acquires additional lessons from teachers that assist her twice per week concentrate to develop her reading and spelling skills.

3. Reason for referral

Lee undertakes a variety of reading tests to determine whether or not her reading ability was comparable to that of a grade levels standard score. The test that was most suitable in the case of Lee was the AIMS web, TAPS-3 and the WAIT-II. These models were identified by Lee's teacher Ms. Lu, due to her low achievement in a variety of subjects, including, English and Literature and to rule out any possible auditory processing or reasoning problems. These testing instruments were important to consider during the establishment of an academic intervention plan for Lee.

The following Assessments and test were done on Lee taking into consideration the following:

- AIMS web: ability to perform tasks in certain segmentations; reading fluency and reading comprehension.
- TAPS-3: auditory abilities were test through the completion of multiple tasks, including word discrimination, phonological segmentation, number memory, word memory, sentence memory auditory comprehension and auditory reasoning tasks.
- WIST—II: skills in word reading, reading comprehension, pseudo word decoding, numerical operations, math reasoning, spelling etc.

4. Problem identification/validation

Lee is an African female learner who speaks both Afrikaans and Zulu. At school Lee speaks English to her teacher and classmates. Her teacher provides instructions in English only. What is interesting is that most of the learners in the school are exclusively Zulu speaking learners. Based on information congregated from her personal file and interviews with her teachers, Lee has no history of any serious medical illness or disability. She looks healthy and active.

Lee has struggled academically, she receive low marks for her assignments, tests and progress report, since her enrollment at Norkem Park girls school. Prior to Lee's enrolment at Norkem Park she was attending a different Elementary school for the first grades. Lee commence at Norkem Park during the middle of the first semester. Lee's teacher Ms Lu made several

amendments to assist her. Lee was granted preferential seating in front of the classroom. The teacher has given her one-on-one instructions when possible. None of these preferences have helped Lee, instead she continues receive Cs, Ds and Fs marks.

Lee lives with her mother, grandmother and two brothers in Kempton Park, Gauteng. Lee's mother has full custody of her. The Principle of Norkem Park reported that one of Lee's brothers did not meet the requirements on the entrance exams at Norkem Park. Lee is an energetic child, characterized by her smiling face and her desire to communicate with others freely. Lee further, demonstrates athletic by high-jumping, long jump and during the breaks she is practicing stretching exercises. Although her favourite sports are tennis and football she practicing them every second day and like to watch them on television. She would like to be a sports teacher when she becomes an adult.

5. Data collection

It was found that Lee's cumulative file does not contain any information about her performance at school she previously attends. There are also no records regarding past special amenities received from her previous school. Since Lee attends the Norkem Park Elementary girl's school, she has not yet been issued with a report. However, Lee has been issued several progress reports.

In the reports her teacher attests her marks as Cs, Ds and Fs since she entered Norkem Park. After assessing Lee's work, it became clear that she struggles with reading comprehension skills. Although Lee has been able to earn Cs in Math, she still has received Ds and Fs in all other subjects.

6. Interviews

Lee stated that she misses her old friend from the previous school and that she does not get along with the kids or adults at Norkem Park. Ms Lu noticed that Lee struggles to make new friends. Ms Lu said Lee often gets into arguments with other learners and her ability to maintain friends at her new school is a huge concern. Ms Lu was asked if she has any knowledge as to why Lee was transferred to Norkem Park, she said that she believes Lee was expelled due to misconduct. Ms Lu also mentions that Lee had already been suspended from Norkem Park, after speaking disrespectfully to the principal of the school.

Both Lee and her teacher stated the social problems that Lee experience, clearly have an influence academically on her. Ms Lu explains that Lee tends to lose her temper often in the classroom when she is having difficulty with a subject. She will hit her head with her hands, slam her pencil on the desk, and "shut down" emotionally. When this happens Lee stops exerting any effort into her learning, resulted in her not understand the lessons being taught. This is clearly that Lee experience great frustration both with her school work and with forming successful interpersonal relationships at school.

6.1. Observations

On the day of the test administration Lee complaint and sociable, appeared joyful and excited about meeting the examiner when leaving the classroom for the test. Lee was very inquisitive during the entire testing session and she asks the examiner several personal questions. During the test Lee seems cheerful, very active, frequently standing up, doing push-ups, grabbing the examiners clip board, and scratching the tables. Lee expresses frequent concern about the correctness of her work; she was doing by asking the examiner after each question "is that right"? Although the examiner encourages her, she clearly was not satisfied enough and demanded feedback from the examiner on each question that was very important to her.

In order to gain more information about Lee's learning environment, an instructional observation sheet was used to assess Ms Lu's instructional style. Oral instruction appeared to be

Ms Lu's main method of teaching her learners. Practically all of Ms Lu's lessons were taught without the use of visual aids or demonstrations. Neither the children, nor Ms Lu was using the white board during class. Instead the lessons were taught orally. This could prove to be problematic for learners who require visual aids and demonstration during instructions. Ms Lu addressed the learners with individual learning difficulties (such as Lee) by frequently calling on them for answers and visiting their desks frequently to make sure these learners remained on task. Ms Lu explained later that it is typical for her to be working closely with Lee during class lessons, calling her and attending to her questions frequently. Ms Lu demonstrated excellent classroom management skills and appeared to create a warm, support environment for her learners.

During the observation of her teacher, Lee was also observed in the classroom. It was found that she interacted with other classmates in a positive manner, but generally did not choose to interact with her peers very often. Lee appears to be quiet and shy, during a free break; she rather sits away from the rest of her classmates. Lee engaged in lessons, writing down answers in her workbook and following along in the reading, at times she turn the pages in her book to different chapters, reading different stories instead of the following lessons. Although Lee's engagement was not always consistent, she still appears to be motivated to produce good work during the lesson and frequently asking the teacher "is this good? Do you like this?" Overall Lee seemed to be adequately engaged and motivated throughout the observation.

6.2. Test

The outcome of the following tests and assessments, on the AIMS web, TAPS-3 and the WAIT-II disclose information that was very helpful regarding Lee's areas of academic strength and weakness. Lee scored a high-average range of grade 1 AIMS-web reading analyses. This means that Lee is currently able to read at a normal level among first grade learners. Specifically, Lee scored in the high- average range on the reading fluency analysis and the reading comprehension analysis at the first grade level. When the two readings analyses were given to Lee at the second grade level, she scores in the low average range.

In order to gain more information, phoneme segmentation and a nonsense word fluency analysis were also administered to Lee at the first grade level. Lee earned an average score on the grade 1 nonsense word fluency analyses; however she scored in the bellow average range of the grade 1 phoneme segmentation analyses. Lee achieved an overall score that was in the low-average range on the TAPS-III test. Specifically, Lee scored in the low-average of the Phonological Index, demonstrating typical skills in discerning phonological differences and similarities between word pairs, manipulating phonemes within words and blending individual phonemic sounds. Lee scored in the low-average range of the Auditory Memory Index, showing low- normal abilities in retaining and manipulating sequences of numbers, and recalling remote word lists. Although these abilities proved to be adequate, Lee demonstrated general weakness on all the tasks presented by the TAPS-III. On the WIAT-II Lee demonstrated normal cognitive abilities. She achieved a total composite score that was in the low-average range when compared to other children her age. Specifically, she scores in the low-average range of the reading and oral Language Indexes.

On the Mathematics and Written Language Indexes she scored an average. Within the Reading Index, Lee experiences more difficulty on tests of phonological awareness, word recognition, and comprehension of the read content; however she demonstrated personal strength in the area of phonetic decoding. On the Oral Language Index, Lee scored in the low-average range, showing that she struggles with tasks that require her to match pictures with corresponding words or details.

Lee also completed the Academic Competence Evaluation Scale – ACES whereby learners are also rated from. Based on her responses, Lee feels that she is most inadequate in the area of interpersonal skills. Although she believes that she struggles with interpersonal skills, study skills, reading skills and critical thinking skills, she feels more confident in her mathematical skills. Lee consistently indicated the frequency level "sometimes" for exhibiting interpersonal skills, engagement and motivation.

7. Conclusion

After considering the collected data it would appear that there is reasonable cause for concern regarding Lee's academic performance. Academic intervention also appears to be necessary. Based on the data collected from the AIMS-web tests, the baseline achievement level for Lee is high- grade 1. Therefore the intervention process would begin with teaching skills at this baseline high- grade 1 level. Tests of Lee's cognitive abilities show that she has the ability to perform at grade level with her peers; however Lee struggles to do so. This might be due to a variety of things. One hypothesis is that Lee could be experiencing difficulty in school due to her recent transfer to Norkem Park.

For Lee to arrive at a new school environment, making new friends and adapt to new classroom expectations was difficult. It is clear from Lee's report that she does not feel comfortable in her new school yet and struggle to get along with other learners at Norkem Park. Another Hypothesis is that Lee cannot adapt to the classroom environment and the kind of teaching style her teacher use. After observing Lee and her teacher, one could see that Lee was unable to follow the teacher's instructions. Lee needed to be reminded regularly by Ms Lu to turn to the correct page in the book and complete the correct work in her book. This indicates that Lee was not able to focus during instructions that might be due to the teaching style of her teacher and also due to carelessness. It is recommended that Lee be assessed by her paediatrician in order to determine whether or not she experience an attention deficit exists.

Intervention model

8. Goals for intervention.

- By the end of September 2015, when given a second grade reading paragraphs, Lee will accurately and fluently read 56 correct words per minute as measured by one minute curriculum-based- measurement reading analysis.
- By the end of September 2015, when given a second grade reading paragraphs, Lee will accurately identify words that complete full sentences and earn 18 responses correct as measured by three minute maze reading analyses.
- By the end of September 2015, Lee will be able to phonemically segment 51 words at the first grade level as measured by one minute phonemic segmentation analysis.

9. Intervention plan

- Intervention

The intervention will take place twice per week, on Monday and Thursday mornings an interventionist will implement the intervention plan with Lee on these days in a separate classroom where no other learners are working. During the intervention, visual and kinesthetic exercises and activities will be used. All instructions will be very basic and easy to understand. Based on her indicated areas of academic weakness, the intervention will focus on practice with mainly reading fluency and reading comprehension. While focusing mainly on these two areas, error words that Lee has particular difficulty with will be monitored as the intervention continues. These error words might be sounded out and "clapped out" so that practice with phonemic

segmentation is also developed during the intervention. As the intervention begins, Lee will practice reading at the high-grade 1 level.

- Methods

Lee expressed her desire for continuous positive feedback, during both test administration with the examiner and classroom activities with her teacher. For this reason, Lee will be rewarded for her successes throughout the 14 day intervention period. Not only will Lee be rewarded for hard work and improvement on tasks, but she will also be rewarded for simply staying on task and following the rules (since these are both areas of personal weakness for Lee). For example, Lee would be rewarded for every 15 minute period in which she remained seated and on task. Rewards for Lee might include candy, small toys, or breaks when she would be able to move, jump, and do push-ups. In the Journal of Abnormal Child Psychology Douglas and Parry, (1983 pg 313), stated: "an unusual sensitivity to rewards in hyperactive children," Since Lee often has difficulty with staying seated and focused during lessons, rewarding her for accomplishing these tasks is likely to produce positive results.

Using visual and kinesthetic exercises to maintain Lee's attention will be crucial during intervention as well. This means that Lee will review target words in tangible ways. For example, if Lee struggles with reading the word "apple," a beneficial exercise might be for her to colour in a picture of an apple with a correctly spelled label on it. The material and curriculum will consist of activities that utilize interactive elements that provide learning intangible ways, as opposed to the simple oral practice that Lee experienced in her classroom. According to research, "How much a given learner learns in a class is governed in part by that learner's native ability and prior preparation, but also by the compatibility of his or her learning style and the instructor's teaching style" (Felder and Silverman, 1988 pg. 674). It is important for the intervention provider to develop an understanding of Lee's learning style so that instruction can be adapted to best suit her.

The intervention will also contain activities that are uncomplicated and easy to understand. Lee often experiences difficulty focusing. This might be because that she has difficulty understanding directions. It has been shown that, "understanding depends on interaction between elements of the information and diagrams that can reduce cognitive load and enhance understanding" (Marcus, 1996 pg. 49). For this reason, all instructions will be kept basic and easy to understand. Activities will be selected that provide simple instructions. Lee will be asked to perform activities with clear and easy to follow instructions that are provided to her orally and/or visually.

- Materials and Curriculum

One of the main purposes of this intervention is to increase Lee's reading fluency. One exercise that will provide practice in reading fluency is the Fluency Strategy exercise. This exercise is designed to increase word and paragraphs fluency. First the learner performs a cold reading of the paragraphs and is timed for one minute. The instructor records the errors the learner makes while they read and offers feedback saying, "Yes/No, that word is …….. What is the word? Now please reread the sentence." Next, the instructor models the proper way to read the paragraphs. After the instructor has read the paragraphs to the learner, the learner and the instructor read the paragraphs together, alternating sentences as they read. The learner and the teacher must review the flashcards of error words thoroughly and finally the learner re-reads the paragraphs once more.

Several materials are required for this exercise including a bag, a timer, a red pen, several grade level reading paragraphs, flashcards and a PVC pipe-phone. Practicing repeated reading using the Fluency Strategy exercise is likely to help Lee improve her reading fluency speed. Extensive research has shown that repeated reading has helped many struggling readers succeed. Research suggests that, "repeatedly practicing oral reading of instructional level text with a model

and feedback supports growth in oral reading fluency" (Mather and Wendling, 2009, pg. 61).In addition to improving oral reading fluency, repeated reading practice can also help learners to read silently.

Error words should be reviewed at the start of each new session. This can be done by simply pulling error words from a review bag. The game Bingo might also be used to review error words. Prior to playing this game, Lee will need to draw pictures that represent each of the error words that she has difficulty reading. These pictures will be drawn on the back of each error word flashcard. After she has created pictures on each flashcard, the game can begin. To play Bingo, one flash card will be drawn at a time and when the flashcard is drawn, Lee must name the picture and scratch out the word, segmenting the word phonemically. This will allow Lee to practice phonemic segmentation with error words. If Lee has the error word on her Bingo Card, she can place a chip on top of it.

Once Lee connects one row or column she can yell Bingo and win a prize. This game will be very engaging and it will provide a more stimulating form of instruction for Lee The materials required for this activity include flashcards, a bag, Bingo cards, crayons, markers, and Bingo chips. As Lee improves in reading fluency, she is likely to improve in reading comprehension as well. Studies have shown that, "reading fluency includes at least two activities- word identification and comprehension" (Mather and Wendling, 2009, pg, 70). Although reading fluency and reading comprehension skills seem to be correlated, it is not sufficient enough to claim that after working on reading fluency, no work needs to be done in order to build comprehension skills.

To emphasize reading comprehension skills, Lee will be asked several questions about the paragraphs she reads after the Fluency Strategy exercise. In addition to answering comprehension questions about her readings, Lee will also perform a visual arts activity where she must use error words from the paragraphs in new contexts. It has been shown that reading instruction that integrates applying reading comprehension skills in context and using the same words in different contexts may increase reading fluency in a way that also improves reading comprehension specifically (Mather and Wendling, 2009, pg. 70-71). Based on this notion, Lee will be performing an activity where she must take the error words from the Fluency Strategy paragraphs and rewrite a new story using the same words. His story can include illustrations as well. This activity will allow Lee to think about the error words in a different context. This activity requires a story booklet, crayons, markers, and pencils.

- Progress Monitoring Strategy

Progress will be monitored once per week using first grade reading fluency analyses and first grade reading comprehension analyses provided by AIMS web. Once Lee has earned scores that are in the superior first grade level, second grade reading fluency and reading comprehension probes will be used. Phonemic Segmentation analyses will also be used to monitor Lee's progress throughout the intervention process.

10. References

[1.] Chafouleas, Sandra., Daly III, Edward., Skinner H., Christopher. (2005) Interventions for Reading Problems. Designing and Evaluating Effective Strategies. The Guilford Press.

[2.] Douglas B, Virginia I., and Parry K, Penny A. Journal of Abnormal Child Psychology, Vol.11, No. 2, pp.313 -326. Effects of Reward on Delayed Reaction a Time Task Performance of Hyperactive Children. 1983.

[3.] Felder N, Richard M., and Silverman V, Linda K. Learning and Teaching Styles in Engineering Education. Engr. Education, 78(7), 674-681. 1988.

[4.] Marcus S, Nadine Z. Understanding Instructions. Journal of Educational Psychology, v88 n1. p49-63. Mar 1996.

[5.] Mather M, Nancy L, Wendling P, Barbara J. (2009) Essentials of Evidence-Based Academic Interventions. John Wiley & Sons, Inc.



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