

TEXILA INTERNATIONAL JOURNAL OF

ACADEMIC RESEARCH

ISSN : 2520-3088

Volume 7, Issue 2, 2020

EDITORIAL POLICY

Papers must be submitted with the understanding that they have not been published elsewhere (except in the form of an abstract or as part of a published lecture, review, or thesis) and are not currently under consideration by another journal published or any other publisher. The submitting (Corresponding) author is responsible for ensuring that the article's publication has been approved by all the other coauthors. It is also the authors' responsibility to ensure that the articles coming from a particular institution are submitted with the approval of the necessary institution. Only an acknowledgment from the editorial office officially establishes the date of receipt. It is a condition for submission of a paper that the authors permit editing of the paper for readability. All enquiries concerning the publication of accepted papers should be addressed to ejournal.assist@tau.edu.gy**.**

PEER REVIEWERS

Dr. Rakesh Ranjan, Educational Management and Administration, MAEERs Vishwashanti Gurukul School, Solapur.

Dr. Rakesh Kumar, Manger Examinations, Texila Educational and Management Services.

Dr. T. Selvankumar, Professor and Head, Mahendra Arts & Science College.

ABOUT PLAGIARISM

Plagiarism is the use or close imitation of the language and ideas of another author and representation of them as one's own original work. Duplicate publication, sometimes called self-plagiarism, occurs when an author reuses substantial parts of his or her own published work without providing the appropriate references. This can range from getting an identical paper published in multiple journals, where authors add small amounts of new data to a previous paper.

Plagiarism can be said to have clearly occurred when large chunks of text have been cut and pasted. Such manuscripts would not be considered for publication in TIJN Journal. But minor plagiarism without dishonest intent is relatively frequent, for example when an author reuses parts of an introduction from an earlier paper. The editors will judge any case of which they become aware (either by their own knowledge of and reading about the literature, or when alerted by referees) on its own merits.

The paper containing the plagiarism will be obviously returned back to the author's for review, but we earnestly request the authors to avoid submitting plagiarized.

DISCLAIMER

Texila International Journal of Academic Research (TIAR) make every effort to ensure the accuracy of all the information (the "Content") contained in its publications. However, the TIAR and its agents make no representations or warranties whatsoever as to the accuracy, completeness or suitability for any purpose of the Content and disclaim all such representations and warranties whether express or implied to the maximum extent permitted by law. Any views expressed in this publication are the views of the authors and are not necessarily the views of the Editor's or Texila International Journal of Academic Research.

TABLE OF CONTENT

1	The Impact of the Trade War Between the USA and China on the Global Economy: The Reaction of Professional Men and Women in Zambia Wendy Mumbi Margaret Chibesakunda	1
2	The Perception of Instructors and Learners' in Expertise Building in Vocational Courses in Ghana Mustapha Bin Danquah	8
3	Predictive Validity of Entry Level Mathematics on Mathematical Knowledge for Teaching Basic school Mathematics of Pre-service Teachers in Ghana Millicent Narh-Kert	17
4	Validation of Non-Linear Relationships-Based UTAUT Model on Higher Distance Education Students' Acceptance of WhatsApp for Supporting Learning Douglas Yeboah	27
5	Financial and Non-Financial Incentives to Improve Performance and the Quality of Health care in Hadiya zone, SNNPR, Ethiopia Derebe Tadesse Kintamo	40
6	Features of Problem Based Learning Lesson Plan That Fits into the Realities in the Teaching and Learning of Mathematics for Pre-service Teachers in Ghana Eric Sefa Boye	53
7	Mobile Learning Support in Delivering Distance Education: Perception of Students of University of Cape Coast, Ghana Douglas Yeboah	61
8	An Investigation into Engagement Processes between Antenatal Providers and Users in Lundazi District – Zambia Patricia Mambwe	72
9	Effect of Inquiry-Based Teaching Method on Students Achievement and Retention of Concepts in Integrated Science in Senior High School Mohammed Issaka	78

10	The Prevalence of Malaria amongst Adults in Remote Primary Health Care Facility in South-South Nigeria Oche Prince I	89
11	Assessment of Knowledge of Essential Supply Chain Functions among HIV/AIDS Supply Chain Workforce in Nigeria Sunday O Aguora	95
12	Assessment of Practices and Awareness of Safety Measures of Biomedical Waste Management among Health Workers in Metropolitan Hospitals in Abuja, Nigeria Edith C Okechukwu	103
13	Testicular Torsion in an Adult Male: A Case of Neglected Torsion Nkomba Chamileke	112
14	To Establish the Relationship between Socioeconomic Status to Mental Illness Edna Chirwa Simwinga	115
15	Human Characteristics Prediction from Social Media Data Mustapha Bin Danquah	122

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art001

The Impact of the Trade War Between the USA and China on the Global Economy: The Reaction of Professional Men and Women in Zambia

Wendy Mumbi Margaret Chibesakunda
MBA, International Business Methods Student of Texila American University
E-mail: chibesakundawendy@gmail.com

Abstract

The purpose is to investigate if gender affects knowledge of the International Trade War. The results will show that if both men and women had knowledge in full, of the devastating effects of an International Trade War, before it's escalation, any trade war would be withheld. If women fully understood and participated in war issues, then the negotiations and agreements would be richer, stronger, subtler and firmly rooted especially in developing countries. The Author used the Chi Method to understand how knowledgeable are the Professional Men and Women in Zambia on The International Trade War and the data will show the knowledge imbalance. The Article confirms that more needs to be done with the dissemination of information and participation of women because the lack of knowledge and participation does not bring positive results according to the findings in research which is briefly referred to in the Literature Review. Sadly, it appears that the gender gap will always exist.

Keywords: *International Trade War, Global economy, Gender, Tariffs.*

Background

The Trade War between China and the USA started in July 2018 when President Donald Trump of the USA after months of threats, decided to impose tariffs on China for unfair trade practices. After the imposition of tariffs and failure to negotiate, the USA slapped China with US $550 Billion worth of Chinese products and China has set tariffs on US $185 Billion worth of USA products. China and the USA are currently in a Phase One Deal to adjust and cut the tariffs from the USA and increase China's purchase of products from the USA.

The specific objective of this study is to evaluate the level of awareness in the Professional field of both men and women in Zambia with regard to the International Trade War, which so far has had a devastating effect on the global economy. Presupposing that there was a gender balance in awareness, the study reveals that conflict resolution would be stable and deep rooted.

The Methodology used is primary through questionnaires and secondary, through available literature on the International Trade War. The data was subjected to multi variate analysis to find if any relationship existed and the Chi Method was used.

This information is useful for the Professional Men and Women in Zambia because the global economy is not isolated from the Zambian situation in the sense that, the Professional women and men can disseminate information accurately and their participation can greatly improve Zambian lifestyles and coordination to the greater global economy.

Trade Wars protect national interests and provide advantages to domestic business and this greatly affects job creation and job security. The effect on men and women is always different and adjustments have to be made accordingly because the effects greatly affect, good production and consumption, education, health and general home management.

Introduction

A trade war is an economic conflict from extreme protectionism in which states raise or create tariffs or trade barriers against each other in response to the trade barriers created by the other party.

Trade is simply the exchange of goods and services between countries and that holds the global economy and whatever has an impact on

the global economy affects the price, demand and supply of both domestic and foreign goods/services and the policies across the globe.

As part of the Global Economy the Professional Men and Women in Zambia need to participate and try to show a greater interest in the trade war between China and the USA, disseminate the information and resolve issues before they become global disputes.

China has been in sub-Sahara Africa for decades and has been accused for the decline of industrial employment because of its ability to hold a powerful import and export policy that was launched in 1999 for global inclusion. China has had a great relationship with Africa in general and Zambia is no exception. The Trade War magnitude is not limited just to the USA, therefore, professional men and women in Zambia must take a great interest in the prevailing issues.

Literature review

International Trade has many advantages like comparative advantage, economies of scale, competition, transfer of technology and job creation.

Every economy wants to be globally connected to grow with technology and interconnectivity so that through various growth strategies they uphold competition on the foreign market, create jobs and meet demands for products and services at reasonable prices for the best quality recognised globally.

According to the War Street Journal, the escalating trade war between China and the USA has impacted the global economy very negatively, small businesses gave been badly affected in the USA and the industrial giants have not been spared in Asia and Europe in the export-oriented factories.

This has had dire consequences in Africa because most countries depend on aid and Foreign Direct Investment (FDI) from advanced nations and once aid and FDI reduce, this leads to an economic recession with fewer jobs and a loss in capital flow.

China has been described as the biggest partner of Africa and if China suffers, Africa suffers too and this conclusion is arrived at by the exports, imports and loans from China to Africa according to statistics. The South China Post reported in August 2019 that the African Economic Outlook of 2019 indicates that Africa will be deeply hurt by the trade war through exports to China and Europe and there will be difficulties in the debt servicing of Africa and worst-case scenario China may dump its goods and services very cheaply on Africa.

According to the Press Reports of UNCTAD, UNCTAD warned both the USA and China that they both would be hurt and bilateral, unilateral and trilateral relations they have would decline because of higher prices and trade divisions. Both would lose out and the global economy would remain unstable.

If there is consensus, trade is beneficial to all, but imposing tariffs and threatening trade partners leads to loss of public support and all past achievements are rendered as nothing because everything is put at risk and in the end, there are no winners, but disruption of progress (Anahita Thoms 2019).

The more trade there is, the more an increase in the number of women contributions to the economy and the more benefits women reap in the global economy because their options increase with an adequate education. Cognitive Skills have also been identified as important investments in early childhood and throughout the school years to facilitate constant adjustments to new technology, change and employment and those that lack cognitive skills will always oppose (Worssman 2011).

The Significance of Knowledge of the Prevailing Trade War Between the USA and China

In the USA there are 7 times more women than men and in China for every 115 boys born, there are 100 girls, so men outnumber the women on a massive scale. In Zambia, there are 8 more women than men and for ease of comparison, the USA upholds the reality in Zambia. Women buy most products and services, raise their children and take care of other family members. The Trade War has affected most products and services (Cari Shane 2018). The UN Security Council Resolution 1325 adopted in 2000 protects women’s rights and women's integrity. Gender and women's rights go hand in hand. Knowledge of any war will categorize women as a homogenous social group to be either victim or perpetrators. Peace and Security designs categories to offer positive transformation. Men are always actors in negotiations, but the changed roles of women from conflict to peace, while

addressing gender perspectives for conflict resolution now call for the participation of women (Thea Waldron, Erin Baines 2019). For the purpose of peace building and peace-making, gender is a concept that embraces all for greater knowledge, participation and negotiations for richer, stronger, subtler and firmly rooted resolutions in societies Antonia Potter 2008).

As a result of the trade war, there is pressure on job creation and job security, wages, labour rights and the true assessment on the employment distribution, employment growth and the corresponding trade agreements whether bilateral, regional or multilateral. Special attention is paid to the labour market, employment policies and the result of trade liberalization. Income and Job Security are extremely important for the increase of standards, improvement of living conditions and they have a direct link on globalization, outsourcing and Job Creation. The gains have to be distributed well in developing countries like Zambia and thus, professional men and women have to be greatly interested. As an emerging economy, an interest has to be taken in competition and competition laws, especially with regard to the quality of the products made available on the market. China has already been accused by many, as holdings Africa as a dumping grounds for its cheaper and low-quality products. Although the negative perceptions are there, the growth effects of participation in a global economy have led to a lot of initiatives in the import and export of goods and services and any disruptions by a trade war has devastating effects. Political debates and analytical systems end up in a struggle because trade affects the quality and quantity of employment. The informal sector is also greatly affected because it has limited possibilities and if the formal sector has a great analytical system, then the informal sector cannot be greatly hampered by any trade war.

Objectives of the research

The aim was to find out the level of awareness in the Professional field and the extent of knowledge on the International Trade War between China and the USA and Zambia as a case study.

1. Evaluate the level of awareness and Knowledge of the trade war.
2. The application of the International Trade War to the Zambian situation.
3. To cite the main challenge.

The methodology used

The Primary Data Collection was done through questionnaires and the research questions that were asked were:

1. Do you know the genesis and content of the International Trade War?
2. Do you think joining the International Trade War is the best or worst option?
3. Would it be wise to pursue other regional agreements with other countries?
4. What is your view on Unilateral Liberalisation?

The Secondary Data Collection was done through Journals, Books and the Internet.

The study looked at both the primary data and secondary data that directly related to the International Trade War, other than that, a study was conducted on a population of Professional Men and Women in Zambia by limiting the sample to the ages between 35 to 65, not limited to any profession at all.

The individual reaction of countries towards the trade war

- Join the war, this is considered as the worst options.
- Do nothing, which is just as bad as joining it.
- Pursue regional trade agreements with regions outside the warring countries and thus, divert trade.
- Unilaterally liberalize on imports from the warring countries

The above findings are from the World Bank working papers on the usual responses to a trade war.

For the purpose of this paper, the final result sampling was done as follows:

Method: Simple Random Sampling.

Variable: Categorical.

Data: Contingency Table with an expected frequency count of about 4

Hypothesis

Null Hypothesis: Variable A does not help in predicting Variable B and the variables are independent, typically a comparison is between the p- value to the significant level.

Ho- Gender and Knowledge of the trade war are independent.

Alternative Hypothesis

Ha- Gender and Knowledge of the trade war are dependent.

This is the Alternative Hypothesis which is basically that, knowing the level of Variable A can help you predict the level of Variable B. The Variables must be related but the relationship not necessarily causal.

Testing our hypothesis

To compare the findings of the Word Bank which may look theoretical to some people on the general reaction to the trade war, 50 individual professionals in different fields were used as a sample analysis for comparing a variance to the 'theoretical findings' of the World Bank. This will help us determine the different relationship of nominal data. This will help in determining how well the distribution fits to the determined data. The classifications will show whether data is dependent or independent.

The data was subjected to a series of multivariate analysis to find if any relationship existed and the Chi Method was used.

This helps us to test the goodness to fit, the significance of association and the homogeneity or the significance of the population variance. This will greatly help us explain whether or not two attributes are associated 0 probability was due to chance.

The following conditions were fulfilled:

1. Observations recorded and used were collected at random.
2. All the views and reactions of the professionals were independent.
3. The number was/is acceptable

It must be noted that the samples had no effect on one another.

Analysis plan

Chi square method was used for this discrete input and discrete output of data which fluctuates over time and usually used when the null hypothesis is true and there is no category population or set of data and if there is a significant frequency in data. This is best for data analysis plans for quantitative data to be studied and appropriate to study or examine the relationship two nominal level variables. The r value is the number of rows and the c value is the number if columns.

The Reaction of Men and Women in Zambia To the Trade War Between the USA And China

	MALE	**FEMALE**	
Knowledgeable	20	15	
Non- Knowledgeable	5	10	
Our Chi Square Formula	MALE	FEMALE	ROW TOTAL
Knowledgeable	Cell A 20 Obs 35 Exp	Cell B 15 Obs 17.5 Exp	35
Non- Knowledgeable	Cell C 5Obs 15.6 Exp	Cell D 10 Obs 15.6 Exp	15
Column Total	25	25	50

Calculating the expected value

CELL A CELL B
Row Total= 35 Row Total = 35
Column Total = 50 Column Total =25
35 x 50 = 1, 750 35 x 25 = 875
Total no. Of cell = 50 Total no. Of cell = 50
1750 /50 = 35 875/50 = 17.5
CELL C CELL D
Row Total = 15 Row Total = 15
Column Total = 25 Column Total = 25
15 x 25 = 780 15 x 25 = 780
Total no. cells = 50 Total no of cells = 50
780/50 = 15.6 780/50 = 15.6

The difference between the Expected Value and the Observed Value in a Cell Count is the Significant Level or P- Value (a).

This helps to establish if data is dependent or independent and any value between 0 and 1 can be used and in this case the P Value is 5% represented as:

a = 0.05

P- Value is the probability of observing a sample statistic as extreme as the test statistic and the test statistic is a chi square.

Analysing Sample Data with the Degree of Freedom

The degree of freedom is the freedom of links or joints in a sequence, expected frequency counts and chi square statistics are used to determine the P Value.

DF = (r-1) x (c-1) = (2-1) x (3-1) = 2

r = Number of category or data sets.

c = Number of levels for other categorical variables.

Erc = (nr x nc) /n

E_{11}= (35 x 25)/ 50 = 875/50 =17.5

E_{12} = (35 x 25)/50 = 875/50 = 17.5

E_{21}= (15 x 25)/50 = 375/50 = 7.5

E_{22} = (15 x 25)/50 =375/50 =7.5

X^2 (20 -17.5)2/17.5 +(15 -17.5)2 +(15-7.5)2/ 7.5 +(10 -7.5)2 =14

P Value is the probability that a chi square statistic having 2 degrees of freedom is more extreme than 14

P (x^2 is greater than 14.2

Degree of Freedom = 2

Chi square critical value = 14 CV

PX^2 less than 14 = 0.9991

PX^2 greater than 14 = 0.009

Result Interpretation

Since the P Value is 0.009 which is less than the Significant Level (0.05), we cannot accept the null hypothesis.

CONCLUSION: There is a relationship between gender and Knowledge of the trade war and the data herein cannot be of further use.

THE STRENGTHS OF THIS STUDY:

- The data was readily available.
- It was inexpensive.
- Holds absolutely no bias.
- Extremely confidential.

The weaknesses of this study

- The sample size was small, limited to 50 persons
- The literature review is limited to less than 4 authors.
- The scope is limited.

Hypothesis Conclusion

To be significant, the observable value must be equal or greater than the critical value and in this case it was significant.

The Null was rejected and this essentially means that nothing has changed and it cannot be proved as wrong.

The Alternative was accepted means that the education of women and improving their knowledge skills and participation is far greater or a better result than doing nothing.

The test as to goodness of fit is considered a good one because the sampling method was ransom and the variable studied was categorical and the Chi square goodness of fit test is greater than the table value and thus, the null hypothesis was rejected.

The test as to independence is also considered a good one.

There is a difference between the reaction of male and female to the trade war.

Observations as to the test of Independence

This is a test of frequency to show lack of bias.

20/25 of the males had full factual knowledge of the genesis and content of the trade war. The affirmatives hold 40%.

15/25 of the females had full factual knowledge of the genesis and content of the trade war. The affirmatives hold 30%.

5/25 males had no idea or interest in the trade war, this accounts to 10%.

10/ 25 females had no idea or interest in the trade war, this accounts to 20%.

15/15 of the females regarded joining the trade war as the worst option which accounted to 30%, compared 15/25, of the males, that is, 30% who considered it the worst option.

Both genders upheld a 100% score that doing nothing about the trade war was just as bad as joining it.

15/25 of the females, that is, 30% upheld the view that the possibility of pursuing other regional agreements with regions outside the warring countries to divert trade was the best option, compared to 20/25 males who upheld the same view at 40%.

The view of Unilateral Liberalisation did not uphold any score with most ignoring it and seeking further information.

The findings of The World Bank to the reaction of countries to the trade war is inferred from the basic reactions of the broad spectrum of people and holds to be true.

Discussion

There will always be disputes and these are settled mostly in the Courts of Law or through Alternative Dispute Resolution (ADR)-mainly,

mediation and arbitration. When both men and women are involved in designing the resolutions to peace building and conflict management, the terrain that is greatly ignored by men is meticulously addressed by women such as care giving for the aged, addressing orphans, health care, education and food reserve. If women are for example, variable x and completely taken out from Dispute Resolution Methods, it would be a great injustice because in Zambia and the USA for instance, women are more than men and make great advocates of peace, the best observers and dispute resolvers. Women need all the support they can get, to address problems without impunity. China has been said to be more willing and better equipped to uphold the working conditions in Africa and have greatly diversified in the distribution of goods and services, this expansion of trade has led to changes in technology and that change means that both men and women must upgrade their knowledge and participation in information technology (Brauntigam D, 2010).

The relationship between gender and Knowledge of the trade war is very obvious that men have more information than women, women would rather not participate at all while men have more knowledge, do not hold long lasting solutions. These results are consistent with other works and the observations have been highlighted. The war applies greatly to the Zambian situation because the Zambian statistics show that women are more than men and head household and the women are more in the Professional field. With China, Zambia is part of sub- Sahara Africa and has had great dealings with China, the trade war has had an impact on Zambia. The domino effect is that export values and revenue generation may fall, but the greater impact is that trade between Zambia and China may vastly increase, while for the USA which favours its protectionism and is reluctant to venture in Africa will both be favourable at all.

Limitation

The Trade War magnitude is limited to the strength that each country wants to hold as a ransom to the other, which is greatly unfair and a huge disadvantage to the global economy. Knowledge and awareness are also highly subjective and limited to the knowledge, personal views and magnitude of the professional transactions concerning the international market.

Summary

The research is conducted on the topic

The Impact of the Trade War Between the USA and China on The Global Economy – The Reaction of Professional Men and Women in Zambia. Notably identified is the knowledge and awareness imbalance between men and women. The issues prevailing in the current International Trade War between China and the USA with Zambia as a case study. Lack of knowledge leads to lack of participation or agreement in the issues that affect the Global Economy. Zambia us part of the Global Economy and there has to be a proactive base that would allow it to disseminate information from the elementary to professional level to enable the utilization of information and allow it to take a positive stance and position to state in clear terms it's Sovereign view of issues affecting the Global Economy because each and every household buys goods and services.

The International Trade War affects every product and service provider, customer and consumer. The women have been identified in both the USA and Zambia as the major end users. Therefore, the dissemination of information and participation is very important. For information to be useful, it must be timely, complete, quality and relevant. The published information must enable the decision maker to make informed decisions that are accurate, valuable, important and most of all useful.

The challenges are a lack of surveillance and updated statistics to know the exact number or ratio from a reliable source to know the levels of knowledge, awareness and participation.

The other challenge is the general tendency for both genders, particularly, here in Zambia to think that The International Trade War is far and remote, this is cultural, but ignorance is not a defence. The dynamics of the Global Economy call for the participation, constant updates and strategies for the decision maker.

Labour reforms and trade reforms always need massive adjustments pre, during and post a trade war because of the loss of earnings, labour churns, redistributed income, massive layoffs and regional concentration. The loss of income and its effect is always devastating and effective strategies are needed to affiliate global compliance to concession and economic recovery. This is not an easy task, but provided there is adequate data, resources, commitment

and control, the effects become manageable and statistics are managed better.

Conclusion

Every war has a devastating after math and every great leader who is an authentic visionary for the greater good will build diplomatic relations and focus on internal operations to uphold trade policies for national and international development in bilateral and multilateral relations to build a better legacy. If the professional population in a country is unaware or uninterested in the trade war or any major global issue, it is worrying because it would mean they would have no global platform to address any global issue independently and frequently, statistics would also be difficult to compile. There is also need to address gender issues and perspectives for conflict resolution. Globalization calls for countries to shape their standards according to the current trends and dynamics in the global economy to escape from the weakness of the internal structures and standards, since women are more than men, they must be at the forefront of finding resolutions before the eruption of devastating wars.

Recommendation

I greatly recommend that trade wars should never be encouraged and The World Trade Organization must envision a benefit for each country and thus never encourage any trade war from the outset. The escalated Trade War although valid to the two countries, is a great inconvenience to all stakeholders. From our findings, it is clear that people will hold various views, but the devastating effects will only be felt after a long time due to a lack of agreement. There should also be greater dissemination of information and participation from schools to the Professional field because it is the women who suffer the most from the devastating effects of any war as burden bearers.

Zambia must have institutions that are distributed country wide to enable the allocation and the utilization of resources to adjust and adapt to improve self-sufficiency in times of global wars and loss especially. Workers are usually displaced and it's better to move to an area in need and sustain a good job with lesser benefits, than no job at all. The greatest recommendation is improving the infrastructure and its quality and providing education. The duty is with the government more than civil society because government can intervene much quicker with no or less interference.

References

[1] Agbajobi, S. 2010. The Role of Women in Conflict Resolution. University of Birmingham.

[2] Anahita Thoms. 2019. In the Long-Term Trade Tensions Will Produce Losers. World Economic Forum Articles. Cologny, Geneva Switzerland.

[3] Brauntigam D. 2010. The Dragon's Gift- the real story of China in Africa. Oxford university press.

[4] Marion, J. Ralf Peters. Jose Marie Salazar-Xirinachs. 2011. Trade and Employment from myths to facts. ILO Publications, Geneva, Switzerland.

[5] Potter Antonia.2008. Women Gender and Peace-making in Civil Wars 97802305845569 in Dorby J, Giuty R. M (ed) Contemporary Peace Making, Palmgrove Macmillan, London.

[6] Rodriguez Clare.2010. Offshoring in a Ricardian World. American Economic Journal. Macroeconomics vol. 2 no. 2 2010.

[7] Sanjay Bulaki Boradi. 2019.International Trade, Types, advantages and disadvantages. efinancemanagement.com.

[8] Simon Ruth, Fujikawa Megumi, Hannon Paul. 2019. US Trade War on Global Impact Grows. The Wall Street Journal. Dow Jones and Company. New York.

[9] Shane Cari. 2018. The Biggest Losers in Trump's Trade War? Women. www.ozy.com.

[10] Waldron Thea, Erin Baines. 2019. Gender and Embodied War Knowledge. Journal on Human Rights Practice pp393- 405. Oxford Press.

[11] Worssman, L. 2011. Education Policies to Make Globalization More Effective. ILO/WTO Publications, Geneva, Switzerland.

[12] York Erica. 2019. New Report Finds Trade War is a lose -lose for US and China. Taxfoundation.org.

[13] UN Security Council Resolution 1325 adopted in 2000. UNCTAD Press. PR. 2019. 03.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art002

The Perception of Instructors and Learners' in Expertise Building in Vocational Courses in Ghana

Mustapha Bin Danquah
Department of Education, Texila American University, Saudi Arabia
E-mail: asalat2007@gmail.com

Abstract

The main objective of the study was to ascertain the perception of instructors and learners regarding the role of supervision on expertise building in building construction course in vocational institutes in Ghana. The study adopted a descriptive survey research design and it was carried out at Cape Coast Technical Institute. Utilizing a simple random sampling technique, 90 students were selected while purposive sampling was adopted in the selection of the 10 teachers for the study. This means, in all, 100 participants were selected for the study. A questionnaire was the major instruction for data collection for the study. The result of the study shows that the teachers and several students strongly believe and were convinced that supervision of instruction can be instrumental to the development of expertise in building construction. It facilitates students understanding of valuable aspects of building construction; develop the right attitude and requisite skills. Given the above findings, it is recommended that instructors should be abreast the latest pedagogical approach in building construction to acquaint teachers with a practical yet simple way of imparting requisite skills in building construction students. Also, teachers of building construction should be cooperative with supervisors, be open and willing to adopt the constructive recommendation of supervisors and refrain from teaching student in an autocratic manner. It is also important for building construction teachers to be abreast with the latest information on building construction to build students' expertise valuable for the labour market.

Keywords: *Perceptions, expertise, vocational, instructors, instrumental.*

Introduction

Among the varied technical courses offered in the twenty-three public Technical Institution across the country is Building Construction trade (Ghana Education Service, 2011). According to Technical and Vocational Education and Training (TVET, 2011) division of the GES, building construction trade is an aspect of TVET programmes aimed at providing individuals especially youth relevant productive and entrepreneurial skills that will prepare them for self-employment. This course will provide students with practical knowledge, skills and attitude relating to the world of work to facilitate their integration into various sectors of economic and social life. The national policy on TVET programmes or courses as stipulated by GES is to promote and develop youths' entrepreneurial skills to effectively eradicate poverty in all its manifestations.

In his study, Amaniampong (2014) posits that technical institute aids the development of expertise, technology transfer and skills development to enhance national development. In essence, TVET should facilitate the ability of learners to acquire creative thinking, flexible problem solving, collaboration and innovative skills they will need to successfully compete in the labour market and survive in life.

Pacific Policy Research Center (2010) also indicated that TVET also fosters human resource development in a country by the creation of skilled manpower which facilitates industrial productivity with a resultant rise in national living standards. This form of education covers courses and programs in engineering, architecture, town planning technology and most importantly building construction.

The objective of building construction is to provide adequate training and disseminate requisite skills to students in technical schools to enable them to secure employment as builders in

corporations and become self-reliant economically. This course also equips students with functional and requisite skills, knowledge and attitude that are instrumental to being a proficient tradesman in the building industry. In summary, the goal of building construction programme includes:

i. To provide an individual with requisite skills, knowledge and values to perform a specific function in the building industry to become self-reliant and useful in the labour market after graduation.
ii. To provide a piece of individual valuable information to facilitate his or her development intellectually and enhance his or her ability to make informed decisions in all aspects of life.
iii. To empower an individual who graduates from the institute with the heightened interest of acquiring higher vocational training to augment his or her skills in building construction technology.

Attainment of the above-mentioned objectives, according to Eze (2015), is capacity building on at all educational level, because it enhances the ability of an individual to perform very well in their chosen career and be self-reliant as far as requisite skills are concerned. On an individual basis, capacity building, according to Njoku (2008) entails shaping behaviours, attitudes, imparting knowledge and developing requisite skills of a student and at the same time improving the level of participation, knowledge exchange and ownership.

Blaise and Blasé (2013) posit that such building capacities requires formative supervision which brings out the best in a student, encourages interactive and peer learning, growth and changes and respect learner's knowledge and abilities. Categorizing formative supervision, Glickman (2012) indicated there are three types, namely: directive, non-directive and collaborative supervision. Of the three forms of supervision, collaborative supervision is described as superlative and dynamic because it is required that supervisor become an active member of the interaction process and help teachers and students in problem-solving and decision-making processes coupled with the provision of practical solutions to learning-oriented problems.

For the present study, instructional supervision which is formative is considered an effective aid to capacity building in the building construction trades skills acquisition process. Baffour-Awuah (2011) indicated that instruction supervision is directed towards improving the teaching and learning process. Improvement of classroom instruction with the ultimate goal of expertise building ensures:

i. Highly equipped and functional workshop
ii. Implementation of curriculum content in all its forms
iii. Improvement in teachers' classroom practice and professional development
iv. Acquisition of requisite skill in building construction trade.

These goals of supervision are relevant to national development and the achievement of requisite skills in building construction by learners in technical/vocational institutes, hence ineffective supervision will inadvertently reduce teachers' performance and professional development which will ultimately retard learners' progress in the building construction trade.

Statement of the Problem

Several studies (Njoku, 2008; Glickman, 2012; Eze, 2015) adduced reason for lack of employment among graduates from technical/vocational institute in such trades as building construction as the production of hundreds of graduates annually beyond what labour market can absorb. Also, Ezegbe (2002) intimated that several graduates do not have requisite skills because there was no proper supervision of teaching and learning. Instructors are not adequately supervised to improve their teaching approach and emphasis on the acquisition of requisite skills by learners. Looking at the situation, Aina (2011) asserts that due to lack of proper supervision in technical institutes several graduates from these schools do not have the needed competencies or expertise to qualify them for a decent job in their trades. Hence, it is worthwhile conducting an in-depth investigation into the perception of instructors and learners regarding the significant role of instructional supervision in expertise building.

Objectives of the study

The main objective of the study is to ascertain the perception of instructors and learners regarding the role of supervision on expertise building in building construction course in vocational institutes in Ghana. Specifically, the study will cover the following:

i. Decipher instructors and students' perception of the contribution of instructional supervision to expertise building in vocational institutes
ii. Ascertain instructors and learners' perception of the types of supervision for expertise building in building construction

Research Questions

The study was guided by the following research questions:

1. What are the instructors and learners' perception of the contribution of instructional supervision to expertise building in vocational institutes?
2. How do instructors and learners perceive the types of supervision suitable for expertise building in building construction?

Significance of the Study

The relevance of the present study cannot be overemphasized with the alarming rate at which several students graduating from the technical institute with little or no employable skill in the world of work, hence findings of the study will provide relevant information on channeling instructional supervision towards building requisite skill in students upon completion of the building construction course.

Finding of the study will be relevant to supervisors, school administrators and other stakeholders of education involved in Technical and Vocational Education and Training because it will facilitate the rapid integration of practical approaches teachers can adopt during teaching and learning to aid students' acquisition of requisite skill for the building industry and self-employment. Result of the study will also add to the literature on the development of expertise in building construction through effective supervision of instruction in TVET institutions in Ghana.

Review of related literature

Concept of Vocational Courses

Technical/Vocational Institutes, according to Boakye (2012), are educational institution charged with the responsibility of providing practical training in scientific and technical subjects. In Ghana, educational reform policies stipulate the establishment of these institutes in all the ten regional capitals following as stipulated in Ghana constitution. The tenet of this law empowers vocational institute in the following ways:

i. To provide education through full-time courses in the field of electrical/electronic engineering, mechanical engineering, building construction, tourism and hospitality, business and such other areas as may be determined by TVET division of GES for the time being responsible for such education;
ii. To encourage study in technical subjects at the second cycle level; and
iii. To provide an opportunity for individual and national development in vocational issues.

In the '60s following the industrial development policy and rapid technological progress in a broad range of areas in Ghana, vocational education became a necessity for the country (Boakye, 2012). This need has not yet abated in Ghana, because in their study, Amedorme, Agbezudor and Sakyiama (2014) indicated that this form of education or technologically oriented education forms a sound footing for technological advancement of any nation, especially developing nation like Ghana. Essentially, vocational education was solely established with the objective of training graduates for skill acquisition and practical knowledge necessary for industrial and technological advancement. Anane (2012) indicated that graduates from the vocational institutes are expected to occupy middle-level manpower required by any country especially in the context of industrial development.

Vocational graduates are trained to use more hands than minds to solve problems that are confronting their nation. Literature (Boakye, 2012; Anane, 2012) revealed that practical training provided at technical/vocational institutes is indispensable to national growth and should not be compromised in any way because it involves Competency-Based Training which is

suitable for Technical and Vocational Education and Training (TVET) inherently associated with the development of requisite skills for the labour market. In other words, technical/vocational graduates receive practical training that Agodzo (2005) described as "do-it-yourself" learning, these graduates pass through training that emphasizes practical work that is demonstrated in the specific tasks he or she can do and is required to do. In effect, competency-based training at vocational institutes is all about gainfully engaging students in practically oriented tasks with the sole aim of developing expertise to survive the ever-increasing competition in the real world.

Okumephuna (2008) indicated that technical/vocational system of education is vastly different from the university and that a developing nation like Ghana needs more vocational graduates since vocational education is purely techno-scientific oriented. TVET system of education is meant to produce technocrats with the sole aim of improving the technological slant of the country for upward progression. Omega (2012) and Okumephuna (2008) posit that unlike predominantly theoretical university education, TVET education is 60 per cent practical and 40 per cent theoretical.

Hence, vocational education should not be negatively compared to the university because their mission, vision and objectives are vastly different from each other and with a developing nation, practical-oriented education will speed up the rate of technological advancement than purely theoretical learning which sometimes do not come to grips with reality (Salawu, 2005). Amedorme et al. (2014) indicated that some authors see TVET as a comprehensive institute offering professional, career-focused programs specializing in industrial, practical, or mechanical arts and applied sciences. This definition underscores the relevance of these institutes in Ghana because it encompasses student practical understanding of the real world, encourages career focus, program development, emphasizes collaborative research and learning with the ultimate goal of national techno-economic development (Ghana News Agency, 2006).

The relevance of Effective Supervision in TVET

To build expertise in building construction, it is paramount that both the government and stakeholders in education make concerted effort to improve the quality of schools and the achievements of students since learning outcomes depend on the mode of instruction and its effectiveness. In his study, Barro (2006) posits that national development and economic growth can only be achieved via higher quality of education and De Grauwe (2001) posits that such type of education depends largely on how teachers are trained and supervised because of their key position in pedagogy. Among other things, De Grauwe stated: “national authorities rely strongly on the school supervision system to monitor both the quality of schools and key measures of its success, such as student achievement (p. 39).

In their study, Sergiovanni and Strarratt (2002) posit that supervision and monitoring of instruction at schools cannot be overemphasized because it develops the expertise of teachers and enhances classroom practices which are crucial to students' academic achievement in any subject. Sergiovanni and Starratt further indicated that the nature of supervision and monitoring is very contributive to students’ academic achievement because it revolves around a collaborative effort between the supervisors and teachers through effective dialogue with the sole aim of improving classroom instruction and practice sessions.

Fisher (2002) further stated that employing effective supervision of instruction, supervisors can adequately influence and reinforce teaching practices with resultant improvement in student learning and the development of requisite skills. This often requires supervisors to carefully study performance and appropriate data regarding classroom instruction to provide meaningful feedback and direction to teachers coupled with appropriate inspection, control and evaluation of their activities (IIEP/UNESCO Module 2, 2007). With these processes in place, classroom instruction will undoubtedly exert immense influence on the teaching and learning process to the benefit of students ultimately.

Fisher (2002) further indicated that effective supervision and monitoring is critical to the objective of providing equal access to quality educational programs for all students irrespective of their background. It behoves supervisors or administrators to emphasize the importance of the appropriate and well-organized program to all teachers, clearly delineating how teachers can employ diverse teaching techniques to meet the ever-changing needs of the students and to provide them employable skills in their respective fields including building construction.

Tesema (2014) posits that supervisors should see to the enabling of individual teachers become an implementer of effective teaching. In all, Tesema intimated that supervisors should be concerned with the following:

i. Ensuring curriculum implementation
ii. Providing direct technical support to teachers
iii. Providing on-the-job training to teachers
iv. Conducting teacher performance evaluation
v. Conducting formative education program evaluation coupled with
vi. Monitoring and coordination

Baffour-Awuah (2011) intimated that in Ghana, the Ministry of Education has the overall responsibility for education sector policy formulation, planning, monitoring and evaluation, while the Ghana Education Service (GES) is saddled with the responsibility of service delivery such as the deployment of teachers, allocation of textbooks, and supervision of schools and teachers. The collaborative efforts of the education sector of the Ministry of Education, Youth and Sports and the Ghana Education Service in the implementation TVET, established in 1992 by the Government of Ghana.

Effective supervision in TVET oriented institutions is anchored or lies within the jurisdiction of the Inspectorate Division at headquarters and Inspectorate Units at regional and district offices. At each level of education, supervisory structures and practices are kept in place to improve instruction; hence responsible personnel involved in supervision in school are given ample training and equipment to augment their competencies and skills via in-service training courses and workshops at the national, regional and district levels. This means all personnel occupying supervisory positions must be abreast effective management techniques to horn their supervisory practices especially in supervising instruction on the building construction course.

Methodology

The study adopted a descriptive survey research design in eliciting relevant information regarding the study. The study was carried out at Cape Coast Technical Institute. Population for the study comprised 120 individuals with 110 being the SS3 learners/students and the remaining 10 being their instructors/teachers. Using simple random sampling technique, 90 students were selected while purposive sampling was adopted in the selection of the 10 teachers for the study. This means, in all, 100 participants were selected for the study. A questionnaire was the major instruction for data collection for the study. Since perception is related to emotion, the four-point Likert scale (Strongly Agree, Agree, Strongly Disagree, Disagree) was employed in preparing the question to identify the degree of intensity. Descriptive statistics through mean and standard deviation involving the use of tables and percentages were used for analysis.

Results and Discussion

Research Question One: What are the instructors and learners' perception of the contribution of instructional supervision to expertise building in vocational institutes?

The focus of this question is to elicit relevant information regarding the perception of both teachers and students concerning the value of supervision of instruction in TVET classes to improving teachers' pedagogical approach with the overall purpose of expertise building in students. Responses of the participants are presented in Table 1.

Table 1. Perception of participants on the value of supervision to building expertise in students

S/N	Item	Students			Teachers		
		Mean	Standard Deviation	Remarks	Mean	Standard Deviation	Remarks
1.	Facilitate instructor's ability to utilize practical approach to classroom practice	3.56	0.64	A	3.92	0.92	A
2.	Helps students acquire valuable requisite skills for the labour market	3.76	0.69	SA	3.72	0.79	SA
3.	Provide a solid footing for implementing the contents of the curriculum of building construction course in the pedagogical process.	3.52	0.60	SA	3.71	0.89	SA
4.	Supervisors provide useful and constructive criticism to augment teachers' knowledge for imparting employment initiatives	3.10	0.82	D	3.89	0.91	SA
5.	Enhances students' dexterous ability within the context of building construction	3.40	0.77	D	2.46	0.71	SA
6.	Enhances students' interest in course thereby improving their commitment to succeed in building construction	3.12	0.81	SA	3.62	0.82	SA
7.	Constructive criticism provided by the supervisor can help teachers utilize teaching tools and equipment appropriately	3.29	0.75	SA	3.75	0.61	SA

n=100 Field Survey, 2017.

Findings from Table 1 shows that on several items both teachers and students agreed that supervision of TVET instruction can be very instrumental in building needed expertise in students for the labour market. However, students did not share teachers' perception on items 4 and 5 indicating they do not perceive supervision to in helping their teachers impart employment initiatives to them and they do not acquire needed dexterous ability within the context of building construction.

Results from Table 1 shows that the teachers and several students strongly believe and were convinced that supervision of instruction can be instrumental to the development of expertise in building construction. It facilitates students understanding of valuable aspects of building construction; develop the right attitude and requisite skills. Result also shows that supervision helps in the implementation of the content of the curriculum and improve students' attitude towards the course and aids teacher's ability to make an informed decision about classroom activities. This result tally with the finding of Anyagre (2016) and Baffour-Awuah (2011) studies that the focus of supervision is to identify and improve factors affecting or hindering the teaching and learning process.

Research Question Two

How do instructors and learners perceive the types of supervision suitable for expertise building in building construction?

The crux of the research question is to elicit and ascertain instructors and learners' perception of what constitutes the right type of

supervision that will enhance expertise building in the building construction course. The responses of the participants are presented in Table 2 below.

Table 2. Perception of participants on the right type of supervision to building expertise in students

S/N	Item	Students			Teachers		
		Mean	**Standard Deviation**	**Remarks**	**Mean**	**Standard Deviation**	**Remarks**
1.	A supervisor is effective when he or she is very interactive not coercive	3.34	0.72	A	3.71	0.83	A
2.	A supervisor is effective when he or she is collaborative and not hierarchical	3.58	0.81	SA	3.85	0.91	SA
3.	A supervisor is effective when he or she is very democratic and not authoritarian	3.32	0.70	A	3.87	0.86	SA
4.	A supervisor is effective when he or she involved teachers in supervision.	3.40	0.81	A	3.92	0.96	SA
5.	A supervisor is effective when he or she does not distance himself/herself from the teacher	2.98	0.60	A	3.28	0.72	SA
6.	A supervisor is effective when he or she is patient and descriptive	3.52	0.79	SA	3.87	0.86	SA
7.	A supervisor is effective when he or she is interested in augmenting teachers' professional knowledge in pedagogical approach	3.26	0.65	A	3.91	0.94	SA

n=100 Field Survey, 2017.

Data presented in Table 2 revealed that both the teachers and the students agreed on all the 7 items contained in the table demonstrating what they perceived as constituting the characteristics of an effective supervisor. Results from Table 2 (Item 1) showed that both the student (Mean =3.34) and Teachers (Mean=3.71) concurred with the notion that supervisors should be interactive and not coercive. In line with this result, Tucker and Stronge (2015) indicated that when supervisors refrain from seeing teachers are incompetent but as aspiring, then they can interact very well with them to horn teachers' skill in imparting employable initiative to students and very familiar with the subject-matter of building construction and quite ready to take on challenges in the teaching and learning process.

Finding from Table 2 (Item 2) demonstrated that both the student (Mean =3.58) and Teachers (Mean=3.85) concurred with the notion that supervisor is effective when he or she is very collaborative and do not see himself or herself as superior to the teachers. The finding of a study by Baffour-Awuah (2011) and Anyagre (2016) tally with the finding of the study that collaborative effort is needed on the part of the supervisor and supervisees in achieving the focus of TVET and in building expertise in the student so that they can be confident and can survive in the labour market.

Results from Table 2 (Item 3) showed that both the student (Mean =3.32) and Teachers (Mean=3.87) agreed with the notion that supervisor is effective when he or she is democratic and very welcoming rather than being authoritative or opinionated. When a supervisor is authoritative, according to Glickman (2012), he or she makes it difficult for the teacher to develop needed professional knowledge and approach to pedagogy because they will not feel comfortable around the

supervisor who feels he or she can just be issuing commands without cognition of the condition of those he or she is supervising.

Results from Table 2 (Item 7) showed that both the student (Mean =3.26) and Teachers (Mean=3.91) agreed with the notion that Supervisor is effective when he or she is interested in augmenting teachers' professional knowledge in pedagogical approach. Such a supervisor, according to Anyagre (2016) and Cobbold, Eshun, Bordoh and Kofie (2015), could go the extra mile to see that teachers get the import of his or her constructive criticism to facilitate its integration into the teaching and learning process in the classroom about building construction. To be noted is that such supervisor will stop at nothing to see that the teachers are abreast latest pedagogical approach to classroom practice and how students' requisite knowledge can be built so that when they can be easily assimilated into the labour market due to possession of requisite skill and expertise in building construction.

Conclusion and Recommendations

The study critically examined the relevance of vocational courses in the two phases, individually and nationally. Ample explication was made with the important role and function of Technical and Vocational Education and Training within the Ghanaian context. This division of GES is primarily geared toward actualizing entrepreneurial learning of students upon admission into the tertiary institution and later into the world of work or labour market. TVET, according to the reviewed literature is highly important and instrumental to the production of graduates that are self-reliant and very pragmatic in activities requiring the manipulation of building construction tools in the accomplishment of construction projects. The result of the study shows that the teachers and several students strongly believe and were convinced that supervision of instruction can be instrumental to the development of expertise in building construction. It facilitates students understanding of valuable aspects of building construction; develop the right attitude and requisite skills. Result also shows that supervision helps in the implementation of the content of the curriculum and improve students' attitude towards the course and aids teacher's ability to make an informed decision about classroom activities. The study also showed that to facilitate the building of requisite skills and expertise in building construction, supervisors need to be interactive, democratic, result-oriented and keenly interested in improving teachers' professional knowledge which in turn will improve classroom instruction with the ultimate goal of providing students with employable skills in the highly competitive labour market.

Given the above findings, it is recommended that instructors should be abreast the latest pedagogical approach in building construction to acquaint teachers with a practical yet simple way of imparting requisite skills in building construction students. Also, teachers of building construction should be cooperative with supervisors, be open and willing to adopt the constructive recommendation of supervisors and refrain from teaching student in an autocratic manner. It is also important for building construction teachers to be abreast with the latest information on building construction to build students' expertise valuable for the labour market.

References

[1] Afework, T. H. & Asfew, M. B. (2014). The availability of school facilities and their effects on the quality of education in government primary schools of Harari regional state and east Hararghe Zone, Ethiopia. *Middle Eastern & African Journal of Educational Research, Issue 11, pp. 59-71.*

[2] Agodzo, S. K. (2005). Competency-Based Learning: The case of Wa Polytechnic of Ghana, CAPA Seminar, Erata Hotel, Accra. http://www.ijern.com/journal/May-2014/43.pdf. Acce

[3] Aina, O. (2011). Business education, technology and national development. Business Education Journal, 5(2), 70-71.

[4] Akhihiero, E. J. (2011). Effect of inadequate infrastructural facilities on academic performance of students of Oredo local government of Edo State. The Nigerian Academic Forum, Volume 20, No. 1.

[5] Amaniampong, K. (2014). Importance of Polytechnic education and the challenges it faces. http://www.graphic.com.gh/news/education/importance-of-polytechnic-education-and-the-challenges-it-faces.html. Accessed June 27, 2016.

[6] Amedorme, S. K., Agbezudor, K. & Sakyiama, F. K. (2014). Converting Polytechnics into technical universities in Ghana issues to address. International Journal of Education and Research, Vol. 2, No. 5.

[7] Anane, A.C. (2013). Competency-Based Training: Quality Delivery for Technical and Vocational Education and Training (TVET) Institutions in Ghana. Educational Research International Educational Research International, 2(2) 117-127

[8] Ankoma-Sey, V. R. & Maina, B. (2016). The role of effective supervision on the academic performance of senior high schools in Ghana. Journal of Arts & Humanities, Vol. 05, No. 04, pp. 73-83.

[9] Anyagre, J. T. Z. (2016). Examining the views of teachers and headteachers on supervision and collective school management in contemporary Ghana. International Journal of Innovative Research & Development, Vol. 5, Issue 10, pp. 99-108.

[10] Baffour-Awuah (2011) Supervision of Instruction in public primary schools in Ghana: Teachers and Headteachers' perspectives. https://core.ac.uk/download/ pdf/11238964.pdf.

[11] Blasé, J. & Blasé J. (2013). Empowering teachers: what successful principals' thousand oaks. USA: Corwin Press.

[12] Boakye, A. E. (2012). Meeting NCTE and NABPTEX standards by Polytechnic in Ghana: Exploring the realities. A thesis submitted to the school of graduate studies Kwame Nkrumah University of Science and Technology, Kumasi.

[13] Cobbold, C., Eshun, I., Bordoh, A. & Kofie, S. (2015). Perception of curriculum leaders and teachers on feedback and conditions essential for effective supervision in senior high schools. International Journal of Educational Research and Information Science, 2(2), pp. 21-26.

[14] De Grauwe, A. (2001). Supervision in four African countries: Challenges and reforms Vol. I. Paris: IIEP/UNESCO.

[15] Ezegbe, C.C. (2002). Towards effective supervision in Nigerian educational system: Educational, administration for colleges and universities. Owerri: Tony Ben Publishers.

[16] The Federal Republic of Nigeria. (2013). National policy on education (Revised). Lagos: NERDC Press, Yaba.

[17] Glickman, D. C. (2012). Supervision of instruction: A developmental approach. Boston: Ellyn and Bacon.

[18] Njoku, U.C. (2008). Business education and value orientation for national economic empowerment and development. Business Education Journal, 6(1), 102-108.

[19] Ogbu, J. E. (2015). Influence of inadequate instructional material and facilities in teaching and learning of electrical/electronic technology education courses. International Journal of Vocational and Technical Education, Vol. 7 (3), pp. 20-27.

[20] Okumephuna, C. (2008). The state of polytechnic education in Nigeria. Guardian Editorial. Accessed June 21, 2016.

[21] Omega, E, M. M. (2010). Repositioning Polytechnic Education in Nigeria.

[22] Pacific Policy Research Center (2010). 21st-century skills for students and teachers. http://webcache.googleusercontent.com/search?q=cache:k-apioOYL2AJ: www.ksbe.edu/_assets/spi/pdfs/21_century_skills_full.pdf+&cd=3&hl=en&ct=clnk&gl=gh. Accessed June 23, 2016.

[23] Seidu, A. (2007). Modern Approaches to Research in Educational

[24] Administration: Revised Edition. Kumasi: Payless Publication Limited.

[25] Sergiovanni, T. J. & Starratt, R. (1993). Supervision: A redefinition. New York: McGraw-Hill.

[26] Sergiovanni, T. J. & Starratt, R. (2002). Supervision: A redefinition (7th ed.). New York: MacGraw-Hill.

[27] Sergiovanni, T. J. (2009). The principalship: A reflective practice perspective. Boston: Pearson Educational Inc.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art003

Predictive Validity of Entry Level Mathematics on Mathematical Knowledge for Teaching Basic school Mathematics of Pre-service Teachers in Ghana

Millicent Narh-Kert
Accra College of Education, Ghana
E-mail: millicentnarh@yahoo.com

Abstract

Introduction: Knowledge about teaching mathematics remains a contentious issue in the preparation of pre-service teachers in Ghana. This study explored relationships among entry-level mathematical knowledge (ELMK), mathematics content knowledge (MCK) and mathematics pedagogical content knowledge (MPCK) scores of pre-service teachers in colleges of education (CoEs) in Ghana.

Methods: The cross-sectional survey design was adopted for this study. A total of 998 pre-service teachers from ten (10) public colleges of education were sampled via multi-stage sampling technique. Structured questionnaire and unstructured observation schedule were used for the survey. College mathematics test results were used as secondary data. The data were analysed using descriptive statistics (frequency count, percentage) and inferential statistics (Pearson's correlation, paired-samples t-test and *regression analysis) with the aid of Statistical Package for Social Sciences software version 22.*

Results: The majority of pre-service teachers in Ghanaian colleges of education had average but relatively weak grades in ELMCK. ELMCK did not significantly predict pre-service teachers' MCK statistically ($p \geq 0.05$) although a statistically significant positive correlation existed between the variables. Although a negative correlation existed between ELMCK and PMCK, ELMCK significantly predicted pre-service teachers' PMCK statistically ($p \leq 0.05$) but the effect size was statistically negligible.

Conclusions: This study concluded that, CoEs in Ghana admit pre-service teachers with average but weak grades in ELMK. Therefore, Ghanaian CoEs should structure and introduce PMCK alongside MCK for pre-service teachers. Mathematics tutors in CoEs should organize remedial lessons for pre-service teachers to scale-up their MCK and PMCK that adequately equip them with MKT.

Keywords: *Entry-level mathematical knowledge (ELMK), mathematics content knowledge (MCK), mathematics pedagogical content knowledge (MPCK), mathematical knowledge for teaching (MKT), pre-service teachers.*

Introduction

Individuals who enroll into Colleges of Education (CoE) in Ghana are known as pre-service teachers or teacher trainees. It is worth noting that one of the major requirements for selection into a CoE in Ghana is the entry level performance grade in the West Africa Senior Secondary Certificate Examination (WASSCE) [1], particularly credit passes or better in Core Mathematics, English Language and Integrated Science. This background attribute or entry level behaviour, with a particular reference to entry level mathematics knowledge (ELMK) shapes the thinking and practices of pre-service teachers' mathematics content knowledge (MCK) and mathematics pedagogical content knowledge (MPCK) while in college. Mathematics achievement entry grade is very critical in assessing pre-service teachers before entry into CoE as reported in Teacher Education (TE) and Development Study in Mathematics (TEDS-M) [2]. This is because it is assumed that entry behavior in mathematics is prognostic of future mathematics performance. Therefore, this study hypothesizes that entry-level mathematical knowledge (ELMK), predicts MCK and MPCK of pre-service teachers which eventually impact on their mathematical knowledge for teaching mathematics (MKT) after college.

The mathematical knowledge for teaching mathematics (MKT) has been of interest to

teacher educators of pre-service teacher education and training in Ghana. Mathematical knowledge for teaching is understanding of the mathematical horizon and it is evident when the teacher demonstrates a broad understanding of how mathematical ideas connect. A teacher who demonstrates knowledge of the mathematical horizon has peripheral vision, for example, they know the questions to prompt students' understanding of mathematical proofs, know when to assist learning as well as when to be patient in allowing the student to work through the problem independently. Studies aimed at teachers' mathematical knowledge mainly have focused on two topics: first, the teachers' characteristics, for example, the number of mathematics courses they have completed, and second, the nature of teachers' mathematical knowledge. It is believed excellent teachers of mathematics must know the mathematics appropriate to the grade level and primary mathematics subjects they teach [3, 4]. Also, researchers [5] summarised much of the then available research on teachers' mathematical knowledge for teaching (MKT) and noted a lack of it can impede teachers' abilities to notice and analyse students' thinking as well as their ability to engage in productive professional conversations.

Having been established that one of the most important factors which influence students' performance in mathematics are the mathematics teachers and the mathematics lessons they receive in school [6, 7]; it is significant that a comprehensive look is made into the college entry-level mathematical knowledge (ELMK), mathematics content knowledge (MCK) and mathematics pedagogical content knowledge (MPCK). The question therefore is, how do Ghanaian pre-service teachers become better at understanding mathematics content knowledge (MCK) and mathematics pedagogical content knowledge (MPCK) in ways that will give them flexibility and insight required for Mathematical Knowledge for Teaching (MKT) in the basic school?

In a study on 'improving teaching and learning of basic mathematics and reading in Africa' [8], it was found that even though initial teacher education programmes had impact on newly qualified teachers, they induced misplaced confidence leading to standardized teacher-led approaches that failed to engage learners. A researcher [9] in a previous study pointed out that graduates of teacher training colleges are ill-prepared in facilitating learning in basic schools. Similarly, it has been observed that most beginning teachers are seen as woefully unprepared for the complex and demanding tasks of the classroom and pre-service teacher education has been regarded as pathetically weak, resulting in new teachers being found wanting and desperate in their initial experience. This observation has not changed because pre-service teachers are still exhibiting weak performances in their 'End of Semester Examination' [10, 11, 12] giving the impression that there has been little improvement in mathematics performance over the years. Several researchers [13, 14, 15, 16, 17] have found that pre-service teachers do not always possess the conceptual understanding of the mathematics content they will be expected to teach. Colleges have not yet been successful in helping students become confident and competent in their teaching of some topics in mathematics [8, 18, 19, 20]. A study which focused on mathematical achievement of pre-service teachers, found out that pre-service teachers had a limited understanding of mathematics [21]. This finding of a basic level of mathematic coursework supports another work which found that teachers only had a cursory understanding of mathematics and lacked the ability to elucidate important concepts [22].

The researcher as a mathematics tutor in a Ghanaian Colleges of Education (CoEs) had observed how pre-service teachers struggled to grasp concepts during lessons. Colleague tutors in other CoEs have also complained about the quality of pre-service teachers they were training. A study conducted by several researchers [23] on behalf of the Professional Board of the Institute of Education, University of Cape Coast, identified the weak qualifications of entrants to colleges of education as one of the major factors of the prospective teachers' poor achievement in the end of training assessment as well as their overall preparedness to teach during their internship. They felt their performances were not up to expectation because of their background in mathematics. Also, there still remain significant number of students still trying to rewrite mathematics examination just for them to proceed to the next level in their academic journey [24]. Evidence abounds that many teachers enter the classroom without a comprehensive

understanding of mathematics [25, 26, 27, 28]. These concerns had been confirmed by the Diploma in Basic Education (DBE) Chief Examiner's report which pointed out that the general performance of the majority of candidates in their method course (Teaching Primary and Junior High secondary mathematics) was not satisfactory, in that, only a limited number of the candidates exhibited good mastery in areas tested as observed by the Institute of Education of the University of Cape Coast [10, 11, 12]. This is to say that the performance of pre-service teachers at the CoEs is nothing different from the performance of students at the basic level. This challenge if not looked into and curbed will jeopardize mathematics education in Ghana. Just as the problem of poor performance in mathematics can possibly be traced to pre-service teachers' lack of mathematical knowledge, the variables ((ELMK, MCK and ELMK) that contribute to the pre-service teachers' mathematical knowledge for teaching (MKT) is less researched into. For this reason, this study analyzed the relationship between entry-level mathematical knowledge (ELMK) and mathematics content knowledge (MCK) cum mathematics pedagogical content knowledge (MPCK) scores of Ghanaian pre-service teachers in CoEs. Thus, it addressed the question, "What is the predictive validity of pre-service teachers' college entry level mathematical content knowledge (ELMCK) on their mathematics content knowledge (MCK) and mathematics pedagogical content knowledge (MPCK)?"

Materials and Methods

This is a quantitative research which adopted the cross-sectional survey design. The rationale for using the design was that it relied on large-scale data from a representative sample of a population with the aim of describing the nature of existing conditions [29]. The target population was three thousand, three hundred and forty (3342) second-year or level 200 pre-service teachers in forty-six (46) public colleges of education in Ghana. Multi-stage sampling was used in sampling nine hundred and ninety-eight (n = 998, 30%) second year pre-service teachers from ten (10) conveniently selected public colleges of education for the study. These colleges were categorized into three geographical clusters of the Republic of Ghana, namely; the Southern, Central and Northern belts. Purposive sampling was used to pick level 200 students. The second-year group was purposively chosen because, with the curriculum of colleges of education, methodology courses which are actually pedagogical knowledge of the various subject areas are taught in second year besides the content knowledge studied in level 100. A combination of stratified and simple random sampling techniques was used to sample 998 (30%) pre-service teachers of the target population. The stratified sampling technique was used to categories and select the respondents based on gender. The simple random sampling technique using the lottery approach was then used to select 645 (65%) males and 353 (35%) female students from the sampled colleges of education. The choice of 15% of the population is based on the assertion that a sample size of 5 to 30 percent of the accessible population is appropriate for a descriptive survey [30]. Again, the sample size was deemed representative of the target population based on the recommendation that a sample size of 10% to 20% of the target population is representative in descriptive research [31].

Structured questionnaire, mathematics test items and unstructured observation schedule developed by the researcher were used to collect data for the study. These instruments were used because of the explorative and descriptive nature of the study. The instruments were pilot tested on twenty (20) level 200 students from Ada College of Education which did not form part of the actual field study. Internal consistency was tested on the questionnaire by means of Cronbach alpha statistics by means of Cronbach alpha reliability analysis via the Statistical Package for Social Sciences (SPSS) software version 22, and this yielded a Cronbach's alpha reliability coefficient (α) of 0.895. Secondary data was also collected in the form of mathematics test results from Institute of Education at University of Cape Coast. The data were described using descriptive statistics (frequency count, percentage, standard deviation) as well as inferential statistics (Pearson's correlation test, paired-samples t-test, regression analysis) which were computed at a significance level (p-value) of $p \leq 0.05$ (2-tailed) at a confidence interval (C.I) of 95% with a margin of error of ± 5. The statistical analysis was done with the aid of SPSS software version 22. The variables or constructs of interest in this study are: ELMCK, MCK and PMCK. ELMCK measures achievement (grade) in core

mathematics at WASSCE level. Content Knowledge in Mathematics (MCK) measures achievement in FDC 112 and FDC 122 as foundation courses at the college level. PMCK measures achievement in Mathematics Methodology (PFC 222) at the college level. The foundation courses are perceived to be the content courses whilst the MPCK course is the methodology (professional) course that the pre-service teacher is equipped with in the teaching of the basic school mathematics.

Results

Background information

Table 1. Background information of respondents (n = 998)

Variable	Freq	%
Sex		
Male	645	65
Female	353	35
Pre-entry mathematics grade into college		
A1	10	1.0
B2	73	7.3
B3	99	9.9
C4	106	10.6
C5	133	13.3
C6	526	52.7
D7	51	5.1

It is observed in Table 1 that more male (n = 645, 65%) than female (n = 353, 35%) pre-service teachers were used for the study. This result suggests that there were more male than female students in public colleges of education in Ghana. With regard to entry level grade in mathematics, the data collected and analysed indicated that many of the pre-service teachers (n = 947, 95%) had good entry grades of A1, B2, B3, C4, C5 and C6. Notwithstanding, only 1% had A1, 7.3% had B2 with 9.9% having B3. It could be seen that mathematical achievement as to obtaining from A to B was not that high. It is also clear from the table that 106 pre-service teachers representing 10.6% of the respondents had C4 with 526 pre-service teachers representing 52.7% had C6 as threshold entry level grade. It could conclude from the table that majority (76.7%) of the students in Colleges of Education had an entry-level mathematics grade 'C' category. Per some reasons of admitting those with D7 in the 2016/2017 batch of pre-service teachers, 51 of the respondents representing 5.1% had D7. This result suggests that about 77% or more of pre-service teachers who enrolled in Ghanaian Colleges of Education had relatively weak but average mathematics grades, and this signaled poor entry-level mathematical knowledge (ELMK).

Table 2. MCK performance of pre-service teachers in college (n = 998)

Variable	N	Minimum	Maximum	Cum.% below 50	Std Deviations
MCK	998	27	96	13.4	6.174

It is deduced from Table 2 that mathematical performance in the content courses in mathematics ranges from 27 to 96. With a threshold pass mark of 50%, it could be deduced that, some of the students failed to get the 50%. One hundred and thirty-four (134) representing 13.4 % of the students failed to get the pass mark of 50%. This shows that although the threshold entry grade 'C6' (ELMCK) was achieved by about 53% (52.7%) of the respondents, this could not be justified in their content course in mathematics (MCK) at the college level.

Table 3. Mathematics performance of pre-service teachers' PMCK in college (n = 998)

Variable	N	Minimum	Maximum	Cum.% below 50	Std Deviations
PFC 222	998	30	86	21.3	8.54

In Table 3, a higher percentage of failure was recorded in the mathematics professional course (PMCK). Evidence of it is the 21.3% total failure to attain the 50% mark. This is a clear indication that pre-service teachers' mathematical knowledge for teaching (MKT) basic school mathematics was low. The relationship between ELMCK and MCK as well as PMCK is further explored through paire-samples t-test and regression analysis which are presented in Tables 4, 5, 6, 7, 8 and 9.

Table 4. Pearson's Correlation between ELMCK and MCK (n = 998)

Variables		Paired relationship		r	df	p-value
		Mean	Std. Error Mean			
Pair	ELMCK-MCK	0.676	0.32	0.41	997	0.197

Key: r – correlation coefficient; df – degree of freedom; p-value or probability value

It is evident in Table 4 that the pre-service teachers' entry grades in core mathematics (ELMCK) and MCK was positively correlated with a correlation coefficient (r) of 0.41, but was not statistically significant with p–value = 0.197 which is greater than the threshold alpha level of 0.05, 2-tailed at a confidence interval (C.I) of 95%. This is an indication of a positive relationship between entry level grade in Core Mathematics ELMCK and the foundation course (MCK). It could deduce that, the pre-service teachers had better entry grades in core Mathematics (ELMCK) as compared to that of the MCK.

Table 5. Pearson's Correlation between ELMCK and MPCK (n = 998)

Variables		Paired relationship		r	df	p-value
		Mean	Std. Error Mean			
Pair	ELMCK- PMCK	0.593	0.251	-0.007	997	0.837

Key: r – correlation coefficient; df – degree of freedom; p-value or probability value

The relationship between mathematics achievement of pre-service teachers before entry into college (ELMCK) and their PMCK was found to be negative and not statistically significant; [r (997) = -0.007, p = 0.837, 2-tailed] at a confidence interval (C.I) of 95%. The negative correlation coefficient is indicative of the abysmal performance of the pre- service teachers in the pedagogy assessment (PMCK) which is a key factor in determining MKT. Table 6 presents information on whether ELMCK is predictive of MCK and PMCK.

Table 6. Paired-samples t-test of ELMCK on MCK and PMCK (n = 998)

Variables		Paired Differences			t	df	p-value
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	ELMCK - MCK	0.676	13.050	0.413	1.638	997	0.102
Pair 2	ELMCK- PMCK	5.958	11.311	0.358	16.642	997	0.001

Key: t – test statistics; df – degree of freedom; p-value or probability value

There was no statistically significant difference in the scores for ELMCK (M=0.676, SD=13.050) and MCK; t (997) =1.638, p = 0.102. The mean difference between performance in ELMCK and MCK was positive (0.676), and this is an indication that pre-service teachers' performance or entry grade in core Mathematics (ELMCK) was better as compared to their MCK at college level. The difference was however not statistically significant ($p \geq 0.05$). This result is an indication that, the ELMCK of an individual does not necessarily predict a persons' MCK.

Comparatively, there was a statistically significant difference in the scores for ELMCK (M=5.958, SD=11.311) and PMCK; t (997) =16.642, p = 0.001 which is less than the threshold alpha level of 0.05). Although the mean difference between performance in ELMCK and PMCK was positive (5.958) and the difference was statistically significant, it is assumed that the predictive validity is not sustainable. Accordingly, regression analysis was carried out to further explore the predictive validity of pre-service teachers' ELMCK on MCK and PMCK at college.

A regression was conducted with PMCK as the dependent variable. ELMCK and MCK were computed in the regression model as controlled variables. The regression model was used to predict validity of mathematical variables on MKT. This is because, in assessing MKT, the relationship is established by use of correlation and then regression used for the prediction. For a linear regression, the equation;

$Y_i = \beta_{0i} + \beta_{1i}X + \varepsilon_i$ where, $\varepsilon_i \sim N(0, \sigma^2)$

$Y_i$is the predicted dependent variable,

β_{0i} is cosntant

β_{1i} is the unstandardized regression coefficient

X is the value of the predictor variable.

ε_i is the error term

Table 7. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.041[a]	.002	.001	11.145	.002	1.663	1	996	.197
2	.0.007[b]	.000	.001	8.647	.000	0.042	1	996	.837
3	.047[c]	.002	.001	8.638	.002	2.191	1	996	.139

Table 8. ANOVA

Model		Sum of Squares	df	Mean Square	F	p-value
1	Regression	205.997	1	206.897	1.663	.197
	Residual	123892.755	996	124.990		
	Total	124099.652	997			
2	Regression	3.188	1	3.166	0.042	0.837
	Residual	74468.945	996			
	Total	74472.011	997			
3	Regression	163.483	1	163.483	2.191	.139
	Residual	74308.528	996	746.07		
	Total	74472.011	997			

From the model summary and ANOVA, it was revealed that in model one, ELMCK contributed to the regression model, $(F\,(1{,}998) = 1.663, P = 0.197)$ and accounted for 0.19% of the variation in ELMCK and MCK. Also, from the model summary, it could be noticed that the p-value (0.0197) was not statistically significant though some variations were recorded. With regard to the ELMCK and the PMCK, a recording of $(F\,(1{,}996) = 0.042, P = 0.837)$ also accounted for about 0.84% of the variation in ELMCK and PMCK. It could be noticed that the p-value (0.837) which is far bigger than the threshold value of 0.05 was not statistically significant. Furthermore, when the MCK and PMCK were computed to ascertain the predictive

validity, a recording of $(F\,(1,996) = 2.191, P = 0.139)$ also accounted for about 0.14% of the variation in MCK and PMCK. Here too, it could be noticed that the p-value (0.139) was also not statistically significant.

Table 9. Coefficients of regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
(Constant)	57.817	3.006		18.860	0.001
ELMCK	0.063	0.049	0.041		0.197
(Constant)	56.949	2.377		23.960	0.001
ELMCK	-0.008	0.038	-0.007	-206	0.837
(Constant)	54.222	1.538		23.960	0.001
MCK	0.036	0.025	0.047	1.460	0.139

From Table 9, it is evident that ELMCK did not statistically and significantly predict pre-service teachers' performance in MCK at the college level. In the same way, ELMCK did not statistically and significantly predict pre-service teachers' performance in PMCK in college. On the predictive validity with regard to MCK and PMCK, though the output showed that it was not statistically significant, the variation was not as wide as compared with the ELMCK. This is an indication that, for one to build enough MKT for teaching basic school mathematics, a lot of factors can be considered besides the entry level mathematics the person has. On observation and reflection of the teaching and learning of mathematics in Ghana, some students had a phobia for the subject and that may contribute to poor performance.

Discussions

Evidence gathered from the findings of this study indicate that the majority (about 77%) of pre-service teachers in Ghanaian Colleges of Education had relatively weak but average entry level mathematics grades (ELMK). Most of the pre-service had grades C4, C5 and C6 as the threshold entry level grade, and this signaled weak ELMK. The findings give credence to result by other researchers [23] who identified the weak qualifications of entrants to colleges of education. Several researchers [9, 13, 14, 15, 16] affirmed that pre-service teachers are woefully ill-prepared and had a limited understanding of foundation mathematics. The implications of the findings suggest that entry level mathematics knowledge (ELMK) is very important to the pre-service teacher since he or she will have to build on it to acquire the MKT to teach basic school pupils. Despite the importance of mathematics to the teacher, this research discovered that, individual pre-service teachers might have different levels of ELMK and that it depends on college mathematics teacher educators or tutors to develop the various levels of ELMK into the needed MCK, PMCK and MKT by the pre-service teacher.

The study found that although the threshold entry grade 'C6' (ELMCK) was achieved by about 53% of the pre-service teachers, this could not be justified in their content course in mathematics (MCK) at the college level. This suggests that pre-service teachers' mathematical knowledge for teaching (MKT) basic school mathematics is low. The finding is parallel to the views of other researchers [25, 26, 27, 28] who documented that many teachers enter the classroom without a comprehensive understanding of mathematics.

The findings found a positive relationship between ELMCK and MCK of the pre-service teachers at the college level. The pre-service teachers had better ELMCK as compared their MCK. This positive relationship between the ELMCK and the MCK might be due to the fact that some of the content courses at college (MCK) and are familiar with the content courses learn at the secondary school level. Pre-service teachers' ELMCK and MCK was positively correlated, but not statistically significant ($p \geq 0.05$). Hence, ELMCK did not necessarily predict MCK of pre-service teachers. The findings validate the views of several researchers [28, 32, 33, 34, 35] who indicated that teachers'

background subject knowledge directly influences students' achievement.

The study established a negative correlation between ELMCK and PMCK of the pre-service teachers. This finding is indicative of the abysmal performance of the pre- service teachers in the pedagogy assessment (PMCK) which is a key factor in determining MKT. Notwithstanding, ELMCK significantly predicts PMCK of pre-service teachers ($p \leq 0.05$) but the effect size was statistically negligible and not sustainable. Several researchers [28, 32, 33, 34, 35] made similar findings. The performance of pre-service teachers in the PMCK was abysmal because it is assumed that PMCK is a new area to the pre-service teachers. The researcher also shares same view that the PMCK course is new to the pre-service teachers and therefore they could not grasp it immediately. The findings suggest that for pre-service teachers to build adequate MKT for teaching basic school mathematics, a lot of factors need to be considered besides the entry level mathematics knowledge (ELMK) of the pre-service teacher. A casual observation and reflection by the researcher points to the issue of phobia for mathematics by some students during the teaching and learning of mathematics in Ghana; this might contribute to poor performance in MCK and PMCK. Should these pre-service teachers fail woefully in these courses (MCK and PMCK), and then what will be the guarantee that they will have the need MKT to teach it in the basic school? In this regard, PMCK must be taken serious in Ghanaian Colleges of Education and more time must be allocated to it by policy makers for strong MKT to be built.

Conclusions

It could be concluded from the study that, CoEs in Ghana admit pre-service teachers with average but weak background in mathematics (ELMK). Again, the performance of pre-service teachers in ELMCK and MPCK as well as MKT is partly dependent on ELMK of pre-service teachers and various factors such as mathematics phobia and pre-service teachers' attitudes to mathematics. It is believed that many pre-service teachers, who are trained in CoEs in Ghana to teach mathematics in basic schools after college, are without firm grounding in MKT. For pre-service teachers in Ghana to take up the job of teaching mathematics to basic school pupils, there should be a level of combination of different theories which should in turn be translated to practice. In this regard, pre-service should be given ample time for professional or pedagogical practice during internship or teaching practice (practicum) while in training. In view of the findings and conclusions drawn from the study, the following recommendations are put forward:

1. The Ghana Tertiary Education Commission (GTEC), which was hitherto known as the National Council for Tertiary Education (NCTE) and the National Accreditation Board (NAB) in liaison with the Principals of Colleges of Education in Ghana should peg the entry grade (ELMK) of C6, and D7 in mathematics for especially those who will not be specializing in mathematics.
2. Mathematics tutors in Ghanaian Colleges of Education should organize remedial lessons for pre-service teachers to scale-up their mathematics content knowledge (MCK), procedural and pedagogical knowledge or professional mathematics content knowledge (PMCK). This would step up their mathematical knowledge for teaching (MKT) mathematics in Ghanaian basic schools.
3. Mathematics tutors in Ghanaian Colleges of Education in collaboration with Principals of Colleges of Education should re-organize the internship programme of the colleges of education to make them more effective in training pre-service teachers who specialize in mathematics and other subject areas.
4. Mathematics tutors in Ghanaian Colleges of Education in collaboration with Principals of Colleges of Education and Ghana Tertiary Education Commission (GTEC) should structure and introduce the methodology course (PMCK) alongside the content course (MCK) for pre-service teachers since the separation of content and method courses often create disconnect for pre-service teachers and tutors as well as researchers. This is to ensure that more time is given to the pre-service teachers to explore MKT in a manner in which they are expected to teach.
5. It is also recommended that The National Council for Tertiary Education (NCTE) design and provide official textbooks and tutor's handbooks for the CoEs to ensure that MCK and PMCK topics are treated in a more practical way.
6. A national committee of experts in mathematics should be put together by GTEC

and NCTE to collaborate with the Ghana Education Service (GES) to consider the drastic reduction in the mathematics syllabus at the basic school level with a view to have fewer topics to ensure in-depth treatment of the topics which should lead to better understanding of mathematical concepts and relevant applications to everyday living. This will help pre-service teachers have fewer topics to cover but with in-depth understanding and mastery to develop their MKT.

References

[1] Narh-Kert, M., & Ampadu, E. (2020). Assessing factors influencing pre-service teachers' mathematical knowledge for teaching (MKT) mathematics in Ghanaian basic schools. *Texila International Journal of Academic Research, 7*(1), 46-60.

[2] Tatto, M., Schwille, J., Senk, S., Ingvarason, L., Peck, R., & Rowley, G. (2008). Teacher education and development study in mathematics (TEDS-M): Policy, practice, and readiness to teach primary and secondary mathematics. Conceptual framework. East Lansing: Teacher Education and Development International Study Center, College of Education, Michigan University.

[3] Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 15(2), 4–14.

[4] Finlayson, M. (2014). Addressing math anxiety in the classroom. Improving Schools, 17(1), 99-115.

[5] Goldsmith, L., Doerr, H., & Lewis, C. (2014). Mathematics teachers' learning: A conceptual framework and synthesis of research. Journal of Mathematics Teacher Education, 17, 5–36.

[6] Rowan-Kenyon, H. T., Swan, A. K., & Creager, M. F. (2012). Social cognitive factors, support, and engagement: Early adolescents' math interests as precursors to choose of career. The Career Development Quarterly, 60(1), 2-15.

[7] Tsanwani, A., Harding, A., Engelbrecht, J., & Maree, K. (2014). Perceptions of teachers and learners about factors that facilitate learners' performance in mathematics in South Africa. African Journal of Research in Mathematics, Science and Technology Education, 18(1), 40-51.

[8] Akyeampong, K., Lussier, K., Pryor, J., & Westbrook, J. (2013). Improving teaching and learning of basic mathematics and reading in Africa: Does teacher preparation count? International Journal of Educational Development, 33(3), 272-282.

[9] Akyeampong A. K. (2003). Teacher training in Ghana: Does it count? *MUSTER Report One. Sussex-Centre for International Education, University of Sussex.*

[10] Institute of Education, University of Cape Coast (2016). Diploma in Basic Education. *Chief Examiner's Report.*

[11] Institute of Education, University of Cape Coast (2017). Diploma in Basic Education. Chief Examiner's Report.

[12] Institute of Education, University of Cape Coast (2018). Diploma in Basic Education. Chief Examiner's Report.

[13] Carrillo, J. (2011). Building mathematical knowledge in teaching by means of theorised tools: Mathematical knowledge in teaching. Dordrecht: Springer.

[14] Asante, J. N., & Mereku, D. K. (2012). The effect of Ghanaian pre-service teachers' content knowledge on their mathematical knowledge for teaching basic school mathematics. African Journal of Educational Studies in Mathematics and Sciences, 10(1), 23-37.

[15] Rowland, T. (2013). The knowledge quartet: The genesis and application of a framework for analysing mathematics teaching and deepening teachers' mathematics knowledge. Sisyphus-Journal of Education, 1(3), 15-43.

[16] Maboya, M. J. (2014). The relationship between teachers' mathematical knowledge and their classroom practices: A case study on the role of manipulatives in South African primary schools. University of the Free State. An unpublished doctoral dissertation.

[17] Howell, H., Lai, Y., Phelps, G., & Croft, A. (2016). Assessing mathematical knowledge for teaching beyond conventional mathematical knowledge: Do elementary models extend. In annual meeting of the American educational research association, Washington, DC.

[18] Agyei, D. D., & Voogt, J. (2011). ICT use in the teaching of mathematics: Implications for professional development of pre-service teachers in Ghana. Education and information technologies, 16(4), 423-439.

[19] Agyei, D. D. (2012). Preparation of pre-service teachers in Ghana to integrate information and communication technology in teaching mathematics. University of Twente, Enschede. The Netherlands. An unpublished doctoral dissertation.

[20] Instefjord, E., & Munthe, E. (2016). Preparing pre-service teachers to integrate technology: an analysis of the emphasis on digital competence in teacher education curricula. European Journal of Teacher Education, 39(1), 77-93.

[21] Rosas, C., & Campbell, L. (2010). Who's teaching math to our most needy students? A descriptive study. Teacher Education and Special Education, 33(2), 102-113.
[22] Floden, R., & Menikeetti, M. (2005). Research on the effects of coursework in the arts and sciences and in the foundations of education. In M. Cochran-Smith, & K. Zeichner (Eds.), Studying teacher education: The report of the AERA panel on research and teacher education (pp. 261-309). Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
[23] Ossei-Anto, T. A., Fletcher, J. A., Annan-Noonoo, G., & Korankye, E. (2013a). Post situational report on colleges of education students' poor performance in science and mathematics. A research report presented to the Professional Board, University of Cape Coast Institute of Education.
[24] Mason, J. (2016). Rising above a cause-and-effect stance in mathematics education research. Journal of Mathematics Teacher Education, 19, 297–300.
[25] Ball, D. L., & Bass, H. (2000). Interviewing content and pedagogy in teaching and learning to teach: Knowing and using mathematics. In J. Boaler (Ed.), Multiple perspectives on the teaching and learning of mathematics (pp. 83-104). Westport, CT: Ablex.
[26] Ball, D. L. (1990). The mathematics understandings that prospective teachers bring to teacher Education. Elementary School Journal, 90(4), 449-466.
[27] Hill, H. C., Rowan, B., & Ball, D. L. (2005). Effects of teachers' mathematical knowledge for teaching on student achievement. American Educational Research Journal, 42(2), 371-406.
[28] Usiskin, Z. (2001). Teachers' mathematics: A collection of content deserving to be a field. The Mathematics Educator, 6(1), 85-97.
[29] Cohen, L., Manion, L., & Morrison, K. (2011). Research methods in education (7th ed.). USA and Canada: Routledge.
[30] Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods for business students (4th ed.). England: Pearson Education Limited.
[31] Gay, L. R., & Airasian, P. (2003). Educational research: Competencies for analysis and applications (7th ed.). Upper Saddle River, NJ: Pearson Education, Inc.
[32] Barth, P. (2002). Add it up: Mathematics education in the U.S. does not compute. Thinking K 16, 6(1), Presented at the 12th Educational Trust National Conference, Washington, DC.
[33] Darling-Hammond, L., & Bransford, J. (2005). Preparing teachers for a changing world: What teachers should learn and be able to do. San Francisco: Jossey Bass.
[34] Heritage, M., & Vendlinski, T. (2006). Measuring teachers' mathematical knowledge. CSE technical report 696. LA, the Regents of the University of California.
[35] National Mathematics Advisory Panel (2008). Foundations for success: The final report of the national mathematics advisory panel, U.S. Washington, D.C: Department of Education.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art004

Validation of Non-Linear Relationships-Based UTAUT Model on Higher Distance Education Students' Acceptance of WhatsApp for Supporting Learning

Douglas Yeboah[1]*, Paul Nyagorme[2]
[1]*Cape Coast study center, Institute for Distance and e-Learning (IDeL), University of Education, Winneba, Ghana*
[2]*Maths, Science and ICT Department, College of Distance Education, University of Cape Coast, Ghana*
**Corresponding Author: douglas.yeboah@stu.ucc.edu.gh*

Abstract

This study examined relationships among the exogenous constructs of the Unified Theory of Acceptance and Use of Technology (UTAUT) model to identify those that significantly predict others. Questionnaires were used to collect data from 273 distance education students pursuing various diploma, bachelor's degree and post-graduate diploma programs at the Cape Coast study center of the Institute for Distance and e-Learning (IDeL) of the University of Education, Winneba in Ghana. Proportional stratified random sampling technique was employed to obtain the sample of students. The data were analyzed using Partial Least Squares – Structural Equation Modeling (PLS-SEM). The results indicated that in acceptance of WhatsApp for supporting higher distance learning, effort expectancy and social influence predict performance expectancy; mobile self-efficacy and facilitating conditions predict effort expectancy; and facilitating conditions predict social influence. Also, mobile self-efficacy was found to significantly predict behavioral intention. We recommend that prior to introduction of a new technology such as WhatsApp for supporting learning, necessary resources and training should be provided by educational administrators and faculty to the students. This would make the students perceive that they can use the technology effectively to bring about gains in their learning; and subsequently accept the technology.

Keywords**:** *technology acceptance, WhatsApp for learning, WhatsApp in distance education, structural equation modeling, exogenous variables.*

Introduction

Teaching and learning in educational institutions at all levels have undergone a changing trend from face-to-face modes of delivery to different degrees of blended and distance education modes. This trend of evolution in education is greatly influenced by emerging disruptive technologies. Educationists and researchers all over the world seek new ways of supporting students' learning with emerging technologies. One ubiquitous technology that is accessible to higher distance education students in various parts of the world, especially in Ghana, is WhatsApp messenger mobile application. Some researchers such as [1], [2], [3], [4] and [5] have found educational benefits of using WhatsApp to support learning in higher education contexts.

As in the case of many new technologies, successful implementation of WhatsApp as a learning support tool requires acceptance from students who are the pivot of the teaching and learning processes. It is therefore pertinent for faculty and educational administrators to understand factors that could influence students to adopt WhatsApp as learning support tool before deciding on implementation. Several models and theories have been developed over the years which attempt to explain technology acceptance. One such models is Unified Theory of Acceptance and Use of Technology (UTAUT) [6]. This model explains that intention to adopt a new technology is determined by performance expectancy, effort expectancy and social influence. Also, actual use of a technology is determined by behavioral intention and facilitating conditions. The variables that predict

others are referred to as exogenous variables, whereas the predicted variables are endogenous variables.

The UTAUT model involved only relationships (referred to as linear relationships) between the exogenous variables and endogenous variables. However, [7] proposed non-linear relationships among some exogenous variables of the original UTAUT model. As a result, they proposed a modified linear and non-linear relationships-based UTAUT model that included non-linear relationships. Although before this current study, many studies had been conducted to validate the original UTUAT model proposed by [6], no other studies had been conducted to validate the linear and non-linear relationships-based UTAUT model that [7] proposed in different contexts.

The current study sought to validate the linear and non-linear relationships-based UTAUT model proposed by [7]. The findings of this study will hopefully contribute to the understanding of the linear and non-linear relationships among exogenous and endogenous constructs of the UTAUT model in the context of adoption of WhatsApp for supporting learning in higher distance education. The same knowledge will form a basis for understanding adoption of other technologies as well.

Research Objectives

1. To determine which of the exogenous constructs in the UTAUT model have significant non-linear relationships regarding Distance Education students' behavioral intention to use WhatsApp for learning purposes.
2. To determine whether mobile self-efficacy predicts behavioral intention in the non-linear relationship-based UTAUT model with respect to acceptance of WhatsApp chat by distance education students for supporting learning.

Model Development and Hypotheses Formulation

The original formulators of the UTAUT model [6] proposed and validated existence of direct linear predictive relationships between the independent and dependent constructs. These relationships were further validated and confirmed by subsequent researches over the past years. A new development regarding the predictive relationships among the UTAUT constructs is the possible existence of non-linear predictive relationships among the exogenous constructs of the UTAUT model. [7] proposed the existence of these non-linear relationships based on existing literature. The results of their study confirmed significance of some these non-linear relationships. This section reviews the bases for the proposition of existence of non-linear relationships among the UTAUT exogenous constructs.

Effort Expectancy and Performance Expectancy

The proposition of non-linear relationship between effort expectancy and performance expectancy is based on the Technology Acceptance Model developed by [8]. This model identifies two major belief constructs that are crucial in predicting the attitude of a potential user toward acceptance of a computer technology. These are perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which a potential user of a given technology believes that using the technology would result in improvement in the performance of his or her job. Perceived ease of use also refers to how a potential user of a technology believes that he or she could use the technology without physical or mental effort.

The construct perceived ease of use is postulated to have a predictive effect on perceived usefulness. [8] hypothesized a significant direct effect of perceived ease of use on perceived usefulness. This hypothesis was based on the reason that if the use of a given technology is easier for the users, they are more likely to have improvement in their job accomplishments. Thus, as productivity increases with easy use of a technology, the technology is perceived to be more useful for the designated job.

The constructs perceived ease of use and perceived usefulness in technology acceptance model are the root constructs from which the constructs effort expectancy and performance expectancy of the UTAUT model respectively were derived [6]. By virtue of the derivative of the UTAUT constructs from the technology acceptance model constructs, it is logical to expect the predictive relationship between perceived ease of use and perceived usefulness to replicate between effort expectancy and

performance expectancy as well. This relationship was hypothesized and tested by [7] and their result indicated that effort expectancy determined performance expectancy. Their finding was consistent with [8]. In view of existing literature, this study seeks to validate this relationship by testing the null hypothesis that:

H_{01}: Effort Expectancy does not predict Performance Expectancy

Mobile Self-Efficacy and Effort Expectancy

Self-efficacy is a social psychology concept defined as "judgements of how well one can execute courses of action required to deal with prospective situations" [9]. Before attempting to perform any action such as use of a technology, every individual has an inner perception of his or her ability or otherwise to perform the action. According to Badura, measurement of self-efficacy of an individual should be fashioned to the domain of psychological functioning under consideration [9]. Thus, in the domain of computer technology usage, computer self-efficacy can be considered; whereas mobile self-efficacy can be considered in the domain of mobile or smart phone technology usage.

In technology acceptance model, [10] proposed that perceived ease of use of a technology is determined by control, intrinsic motivation and emotion. The anchoring construct referred to as control consists of two kinds of beliefs – internal control and external control. Venkatesh conceptualized internal control as computer self-efficacy and external control as facilitating conditions. Thus, he established that at early stages of a computer technology usage, perceived ease of use of the computer technology is determined by both computer self-efficacy and facilitating conditions among others.

In the context of this study, the technology used was WhatsApp messenger which is a mobile phone application. Thus, the construct computer self-efficacy hypothesized by [10] as a determinant of perceived ease of use of a computer technology could be likened to mobile self-efficacy in the context of this study. In order to validate the predictive relationship between mobile self-efficacy and effort expectancy (perceived ease of use), a null hypothesis is tested that:

H_{02}: Mobile self-efficacy does not predict Effort Expectancy.

Social Influence and Performance Expectancy

The construct social influence in the UTAUT model is a derivative of subjective norm in Technology Acceptance Model 2 [6], [11]. These terms connote the idea that the acceptance of a new technology by an individual is influenced by how he or she believes others will view him or her as a result of using the technology. If the perceived view of important others is positive, a prospective user is more likely to adopt the new technology whereas vice versa is also likely.

Performance expectancy is also derived from other constructs such as perceived usefulness in technology acceptance model, among others [6], [11]. It refers to the belief an individual has that using a technology would result in improvement in job accomplishments.

Attempts to identify predictive relationship between social influence and performance expectancy were arguably pioneered by [12]. They hypothesized a positive direct effect of subjective norm on perceived usefulness in the formulate of Technology Acceptance Model 2. Their results confirmed the hypothesis, significantly moderated by experience. The predictive relationship between social influence and performance expectancy was subsequently tested by [7] using the UTAUT model. Contrary to Venkatesh and Davis, the results obtained by [7] showed non-significant relationship between the constructs social influence and performance expectancy. This study sought to validate this relationship by testing the null hypothesis that:

H_{03}: Social Influence does not predict Performance Expectancy.

Facilitating Conditions and Performance Expectancy

Facilitating conditions were hypothesized by [7] to be a direct determinant of performance expectancy. The basis of their assertion was that availability of resources and favorable conditions for utilization of a new technology would make prospective users develop favorable attitude towards adoption of the technology and its usefulness. Thus, when prospective users perceive that organizational or institutional provisions are available to support the use of a new technology, the user are more likely to also perceive the technology as one that would require little or no effort in its utilization, and

subsequently more likely to yield gains in job performance. However, the results obtained by [7] from testing the hypothesis was contrary to their assertion. The predictive relationship between facilitating conditions and performance expectancy was not significant at the acceptable significant level ($p<.05$). This study therefore sought to validate this relationship by testing the null hypothesis that:

H_{04}: Facilitating Conditions do not predict Performance Expectancy

Facilitating Conditions and Effort Expectancy

The relationship between facilitating conditions and effort expectancy was hypothesized by [10]. According to the author, facilitating conditions (referred to as external control beliefs) in the technology acceptance model positively determines ease of use perception (effort expectancy in UTAUT) about a new technology. The hypothesized effect of facilitating conditions on perceived ease of use was said to be more paramount particularly at the early stages of user experience with a new technology. Venkatesh tested the hypothesis using data collected from three different organizations over three months period and the data supported the hypothesis. The predictive relationship between facilitating conditions and effort expectancy was later tested by [7] using the UTAUT model and reported that facilitating conditions had a direct positive effect on effort expectancy of distance education tutors on Learning Management System usage. In order to validate this relationship in the context of this study, a null hypothesis was tested that:

H_{05}: Facilitating Conditions do not predict Effort Expectancy.

Facilitating Conditions and Social Influence

In technology adoption, the construct facilitating conditions is perceived to have a potential of influencing the impact of social influence on target users of a novel technology in an organization. This assertion was held by [7]. In their view, the availability of conducive environment for the utilization of a new technology serve as motivation for important referents to encourage potential users or adopters of the technology to accept same. Thus, facilitating conditions likely has the potential to enhance the effect of social influence. Based on this premise, [7] tested the hypothesis that "facilitating conditions will predict social influence" on the adoption of Learning Management System by distance education tutors. Their results supported this assertion. This study further sought to validate the UTAUT model on this postulation by testing the null hypothesis that:

H_{06}: Facilitating Conditions do not predict Social Influence.

Mobile Self-Efficacy and Behavioral Intention

Mobile self-efficacy refers to the belief an individual has in his or her own ability to use mobile communication technologies such as mobile phone, tablet pc, etc. to perform some task [13]. This construct originated from the social cognitive theory of [14]. Bandura introduced the concept of self-efficacy as one's belief in his or her own ability to successfully carry out a certain task.

Self-efficacy is more significant at the initial stages of one's attempt to perform a novel activity. In educational application of mobile technologies, it is logical to expect that people who strongly believe in themselves that they have the ability to use mobile devices and applications would readily accept to utilize the technology in their studies, all other things being equal.

Similar to mobile self-efficacy in the use of mobile technologies is computer self-efficacy in the use of computers and their related technologies. Computer self-efficacy was hypothesized by [6] to have none-significant influence on behavioral intention to accept computer technology. The findings of their study supported their hypothesis, hence self-efficacy was excluded from the original UTAUT model.

Mobile self-efficacy is not a construct in the original UTAUT model, neither has it been theorized in any extended version of the UTAUT model as a direct determinant of behavioral intention in existing literature. It is however postulated in this study that in the adoption of WhatsApp messaging application for distance learning, mobile self-efficacy could play a significant role in predicting behavioral intention of the students to adopt the technology. In order to validate the UTAUT model on the predictive relationship between mobile self-efficacy and behavioral intention, this study tested a null hypothesis that:

H_{07}: Mobile Self-Efficacy does not predict Behavioral Intention.

Based on the preceding hypotheses, the researchers proposed a conceptual model to guide this study. The model named Mobile Self-Efficacy and Non-linear Relationships-based Unified Theory of Acceptance and Use of Technology (MSENR-UTAUT) model is illustrated in Figure 1.

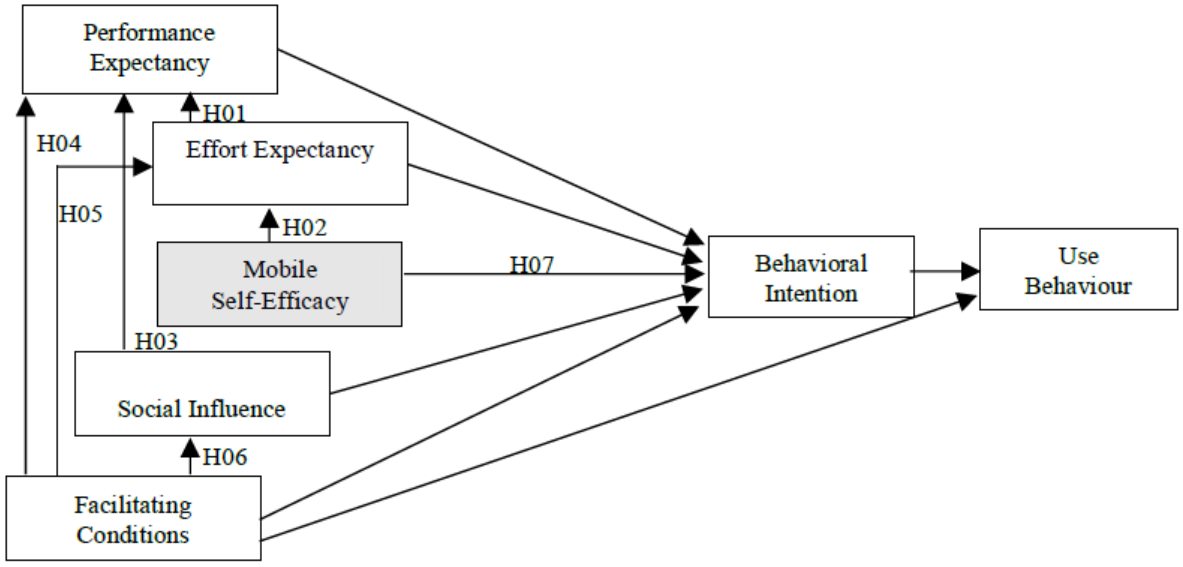

Figure 1. MSENR-UTAUT Model

Source: Adapted from [7]

Materials and Methods

This study employed correlational research design in which structured questionnaires were used to collect primary data from a sample of distance education students. Proportional stratified random sampling technique was employed. The sample consisted of 273 distance education students selected from the Cape Coast study center of the Institute for Distance and e-Learning (IDeL) of the University of Education, Winneba in Ghana. These were pursuing various programs at the diploma, bachelor's degree and post-graduate diploma levels by distance. The sample size was determined based on [15].

Two sections constituted the structure of the questionnaires used for the study. The first section contained 24 statements that measured seven latent constructs required for the study. The constructs are effort expectancy, performance expectancy, social influence, facilitating conditions and mobile self-efficacy, behavioral intention and use behavior. Each statement was accompanied by five-point Likert type scale ranging from strongly disagree as 1 to strongly agree for 5. These solicited students' extent of disagreement or agreement respectively regarding the construct statements. The construct indicator statements were adopted from [6], [16] and [17] and modified to befit the context of the current study. The second part of the questionnaire contained eight items that obtained socio-demographic data about the participants.

The researchers administered the questionnaires by themselves on February 15, February 22, and February 29, 2020. The data analysis involved both descriptive and inferential statistics. SPSS version 25 was used to perform the descriptive statistics which involved frequency counts, percentages, mean and standard deviation. Also, SmartPLS version 3.2.7 [18] was used to perform regression analysis of path coefficients in Partial Least Squares-Structural Equation Modeling (PLS-SEM). All hypotheses were tested at a significance level of 0.05.

Results

Background characteristics of the respondents the participants consisted of 133 (49%) females and 140 (51%) males. Their ages ranged from 20 to 48 years (M = 30.4, SD = 5.03). Age was non-normally distributed, with skewness of 1.32 (SE = 0.15) and kurtosis of 2.02 (SE = 0.29). Distribution of the participants according to academic levels enrolled were 89(33%) Diploma students, 118 (43%) Post-Diploma Bachelor degree students and 66 (24%) Post-Graduate

Diploma students. Other characteristics of the participants are presented in Table 1.

Table 1. Background characteristics of participants

Programme Enrolled	No. of Students	Percentage
Basic Education	111	40.7
Early Childhood Education	62	22.7
English Language Education	8	2.9
Social Studies Education	12	4.4
Mathematics Education	5	1.8
Accounting	13	4.8
Management	13	4.8
Human Resource Management	16	5.9
1 Year Education	29	10.6
Science Education	4	1.5
Total	273	100
Ownership of WhatsApp-supported Mobile Phone		
No	4	1.5
Yes	269	98.5
Total	273	100.0
Whether students used WhatsApp		
No	1	0.4
Yes	272	99.6
Total	273	100.0
Years of WhatsApp Usage		
less than 1 year	9	3.3
1-3 years	59	21.6
4-6 years	85	31.1
more than 6 years	119	43.6
n/a	1	0.4
Total	273	100.0

Table 1 shows variety of characteristics of the participants. It indicates the programs of study that the participants enrolled in as well as respective numbers and percentages of students in those programs. Also, number of participants who owned WhatsApp-supported mobile phones is indicated as 269 (98.5%) as against 4(1.5%) who did not own any. This shows that WhatsApp-supported mobile phones are common among undergraduate and post-graduate distance education students at the Cape Coast study center of the University of Education, Winneba. Another characteristic of the participants is that 272 (99.6%) indicated that they had been using WhatsApp, with the exception of one person who indicated that he/she had not been using WhatsApp at the time of the study. Lastly, years of WhatsApp usage experience is presented. This indicates that 119 (43.6%) of the participants had been using WhatsApp for more than 6 years whiles 144 (52%) had experience of WhatsApp usage between one and six years inclusive. Only one student indicated no experience in the use of WhatsApp. These characteristics of the participants indicate that they had necessary resources and experience that would equip them to accept and use WhatsApp chat to support their distance learning.

Assessment of the Measurement Model

The reflective measurement models of the research model were assessed by testing the individual indicator reliability, internal consistency reliability, convergent validity, discriminant validity, and item cross loadings as recommended by [19]. Item indicator reliability was assessed using outer loadings of individual measurement items. Internal consistency reliability was assessed using rho_A and composite reliability. Also, convergent validity

was assessed using Average Variance Extracted. Finally, discriminant validity was assessed using Heterotrait-Monotrait Ratio (HTMT).

The PLS Algorithm was ran in SmartPLS version 3.2.7 [18] in order to accomplish aforementioned assessments of the measurement model. The outer loadings, reliability and validity estimates of the PLS algorithm are presented in Table 2.

Table 2. Outer loadings, Construct Reliability and Validity of Measurement Model

Construct	Item	Loading	rho_A	Composite Reliability	Average Variance Extracted (AVE)
BI	BI1	0.943	0.926	0.947	0.857
	BI2	0.944			
	BI3	0.888			
EE	EE1	0.872	0.908	0.932	0.773
	EE2	0.919			
	EE3	0.907			
	EE4	0.815			
FC	FC1	0.812	0.874	0.912	0.722
	FC2	0.898			
	FC3	0.829			
	FC4	0.858			
MSE	MSE1	0.885	0.900	0.862	0.677
	MSE2	0.762			
	MSE3	0.818			
PE	PE1	0.779	0.907	0.916	0.732
	PE2	0.943			
	PE3	0.785			
	PE4	0.903			
SI	SI1	0.801	0.736	0.848	0.650
	SI2	0.840			
	SI3	0.777			
UB	UB1	0.930	0.883	0.907	0.767
	UB2	0.955			
	UB3	0.723			

EE, PE, MSE, SI, FC and BI denote effort expectancy, performance expectancy, mobile self-efficacy, social influence, facilitating conditions and behavioral intention respecively.

Table 2 shows that outer loadings of the items in the measurement model ranged from 0.723 (UB3) to 0.955 (UB2). All the outer loadings were greater than 0.708 which is the minimum value recommended by [19] for measurement items to have significant convergent validity. Also, Table 2 reports on internal consistency reliability of the measurement model using composite reliability. This is recommended by [19] as being more robust than the use of Cronbach's alpha. The values of composite reliability ranged from 0.848 (SI) to 0.947 (BI) which were all greater than 0.7 as recommended by [19]. Hence, the composite reliability values indicate that the measurement mode had significant internal consistency reliability. Finally, assessment of convergent validity of the measurement model is reported in Table 2 using Average Variance Extracted (AVE). The minimum recommended value for AVE is 0.5 [19]. Evidently, Table 2 indicates that the AVE values of the model ranged from 0.650 (SI) to 0.857 (BI) which were all greater than the minimum recommended value. The measurement model therefore passed the convergent validity test as well.

The measurement model was again assessed for discriminant validity using Heterotrait-Monontrait (HTMT) ratio as recommended by [20]. The HTMT ratios estimated through the PLS algorithm for the measurement model are presented in Table 3.

Table 3. HTMT Results

	BI	EE	FC	MSE	PE	SI	UB
BI							
EE	0.561						
FC	0.720	0.711					
MSE	0.357	0.764	0.662				
PE	0.658	0.485	0.467	0.220			
SI	0.781	0.457	0.553	0.440	0.704		
UB	0.604	0.617	0.523	0.508	0.411	0.316	

EE, PE, MSE, SI, FC and BI denote effort expectancy, performance expectancy, mobile self-efficacy, social influence, facilitating conditions and behavioral intention respecively

Table 3 shows that HTMT ratios of the constructs in the measurement model ranged from 0.22 to 0.78. All the ratios of HTMT are less than the upper limit value of 0.85 recommended by [20] for a model to have discriminant validity. Thus, the measurement model in this study passed the test for discriminant validity.

Assessment of the Structural Model

Assessment of the structural model is the second stage in the analysis of PLS-SEM. This stage involves tests for collinearity, significance and relevance of path coefficients in the structural model, level of R2 values, effect sizes of f2, predictive relevance (Q2) and q2 effect sizes.

Test for Collinearity

The collinearity of a structural model is assessed using Variance Inflation Factors (VIF) automatically generated by the SmartPLS software during PLS algorithm procedure. The results of inner VIF of the structural model are presented in Table 4.

Table 4. Collinearity (VIF) Statistics

	BI	EE	FC	MSE	PE	SI	UB
BI							1.718
EE	2.503				1.701		
FC	1.994	1.545			1.828	1	1.718
MSE	2.253	1.545					
PE	1.752						
SI	1.665				1.277		
UB							

EE, PE, MSE, SI, FC and BI denote effort expectancy, performance expectancy, mobile self-efficacy, social influence, facilitating conditions and behavioral intention respecively.

As shown in Table 4, each of the values of VIF of the structural model is less than 3.3 which is the maximum recommended value for which the model does not contain common method bias and pathological collinearity [21], [22]. Thus, the VIF values are confirmation that the structural model did not contain common method bias. Significance and relevance of path coefficients.

The bootstrapping procedure in SmartPLS was ran to generate values for assessment of the significance of relationships in the structural model. The bootstrapping procedure involved 5000 subsamples, two-tailed test type and significance level of 0.05 as recommended by [19]. Figure 2 shows a screenshot of the output from the bootstrapping procedure.

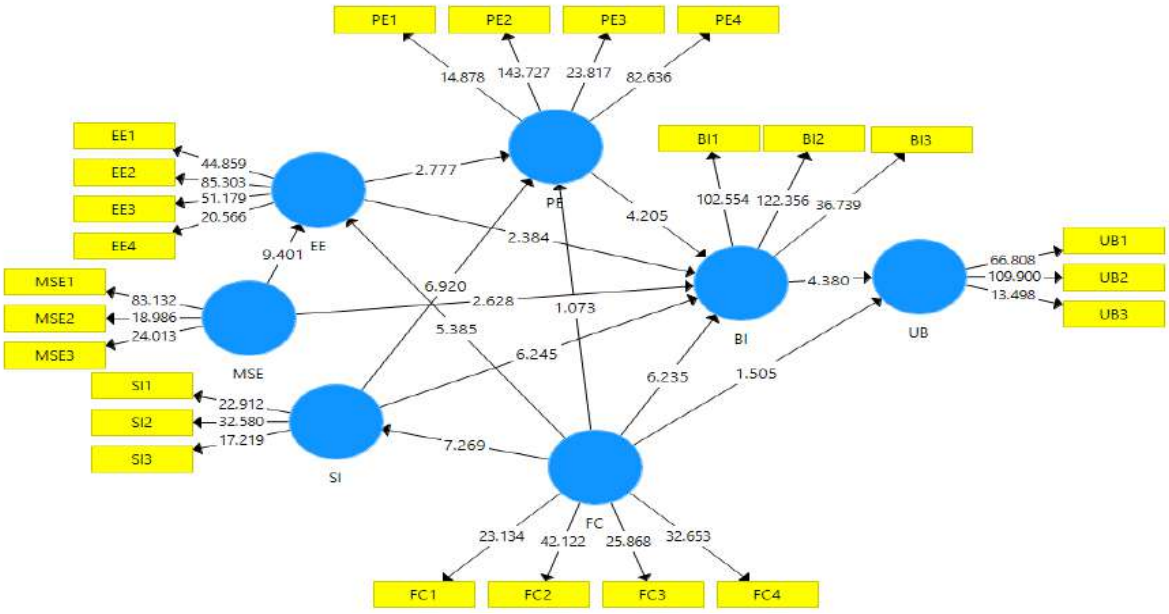

Figure 2. Output of Path Analysis from Bootstrapping procedure

The results obtained from the bootstrapping procedure regarding the hypothesized relationships are presented in Table 5.

Table 5. Results of Path Analysis and Hypothesis testing

Hypo-thesis	Relationship	Std. Beta	Std. Error	t-value	p value		Confidence interval	
						f 2	2.5%	97.5%
H_{01}	EE -> PE	0.212	0.077	2.777	0.005	0.044	0.058	0.361
H_{02}	MSE -> EE	0.483	0.052	9.401	0.000	0.341	0.374	0.577
H_{03}	SI -> PE	0.454	0.065	6.920	0.000	0.258	0.321	0.578
H_{04}	FC -> PE	0.079	0.074	1.073	0.283	0.006	-0.062	0.228
H_{05}	FC -> EE	0.345	0.064	5.385	0.000	0.173	0.222	0.473
H_{06}	FC -> SI	0.452	0.062	7.269	0.000	0.254	0.323	0.569
H_{07}	MSE -> BI	-0.155	0.060	2.628	0.009	0.030	-0.272	-0.036

EE, PE, MSE, SI, FC and BI denote effort expectancy, performance expectancy, mobile self-efficacy, social influence, facilitating conditions and behavioral intention respectively.

With regards to non-linear relationships hypothesized in the model, the results in Table 5 revealed that five out of the six relationships were significant with the exception of one. Performance Expectancy was significantly predicted by Effort Expectancy ($\beta = 0.212$, $p < 0.01$) and Social Influence ($\beta = 0.454$, $p < 0.01$). Conparison of the f^2 effect sizes of the two predictors indicates that Social Influence proved to be a stronger predictor of Performance Expectancy than Effort Expectancy. This is because the f^2 effect size of social influence (0.258) is greater on perfonmance expectancy than that of effort expectancy (0.044). However, the prediction of Performance Expectancy by Facilitating Conditions ($\beta = 0.079$, $p > 0.05$) was not significant.

Effort Expectancy was significantly predicted by Mobile Self-Efficacy ($\beta = 0.483$, $p < 0.01$) and Facilitating Conditions ($\beta = 0.345$, $p < 0.01$). Though both predictors had strong positive relationships with Effort Expectancy, the prediction by Mobile Self-Efficacy was stronger than that of Facilitating Conditions as shown by their f 2 effect sizes. In fact, mobile self-efficacy had the greatest effect size than all else in the model.

The last non-linear relationship reported on in Table 5 is the prediction of social influence by facilitating conditions. The results indicated that

there was a significant relationship between Social Influence and Facilitating Conditions (β = 0.450, $p < 0.01$). Thus, facilitating conditions significantly predict social influence.

Finally, the only linear relationship hypothesized was that between mobile self-efficacy and behavioral intention. The results in Table 5 further show that mobile self-efficacy (β = -0.155, $p < 0.01$) is a significant predictor of behavioral intention, with their relationship being negative.

Coefficients of determination (R2 values)

Coefficient of determination is a measure of the predictive accuracy of structural model. It shows the estimated combined effect of exogenous variables on each of their related endogenous variable(s). The coefficient of determination estimates the amount of variance in an endogenous variable that is explained by the model. The values of R2 are in the range of 0 and 1 inclusive. The closeness of the value of R2 to 1 indicates the strength of predictive accuracy, and vice versa. The coefficients of determination for the structural model are presented in Table 6.

Table 6. Coefficients of Dermination of endogenous constructs

	R Squared	R Squared Adjusted
BI	0.634	0.627
EE	0.554	0.550
PE	0.382	0.376
SI	0.203	0.200
UB	0.309	0.304

EE, PE, MSE, SI, FC and BI denote effort expectancy, performance expectancy, mobile self-efficacy, social influence, facilitating conditions and behavioral intention respectively.

As shown in Table 6, the model explained about 63% of the variance in behavioral intention and 30% in use behavior. Among the non-linear relationships in the model, effort expectancy had the highest value of R2 (55%). This is evidently the result of the strongest effect size of mobile self-efficacy on the effort expectancy.

Discussion

The finding of significant prediction of performance expectancy by effort expectancy is consistent with [8], and [7]. Davis found that perceived ease of use (effort expectancy) significantly determines perceived usefulness (performance expectancy) in Technology Acceptance Model. Similarly, [7] hypothesized and empirically tested this relationship, and their result indicated existence of significant relationship between effort expectancy and performance expectancy within the UTAUT model. Thus, when potential users perceive the use of a new technology to be effortless, they tend to hope that they could use the technology efficiently to maximize their work performance.

Mobile self-efficacy was found as a significant predictor of effort expectancy. This could be explained that an individual's belief in the extent of his or her own ability to use mobile communication technologies influences how much effort the person perceives the use of a given mobile technology would require. Thus, if an individual believes that he or she has the ability to use mobile devices effectively, he or she would naturally expect that using a new mobile technology would require just a little or no effort from him or her. This finding is consistent with [10]. [10] maintained that at early stages of using a computer technology, a potential user's computer self-efficacy (similar to mobile self-efficacy) determines his or her perceived ease of use (similar to effort expectancy). Thus, the finding of the current study logically fits in existing body of knowledge.

The study also found that social influence significantly predicts performance expectancy. This relationship could be explained that if an individual feels other people who are important to him or her think he or she should use a technology, that individual will eventually have a belief that using the technology will probably bring improvement in job performance. The converse is also true. This finding is consistent with [12] These authors found in Technology Acceptance Model 2 that subjective norm (similar to social influence) significantly determined perceived usefulness (similar to performance expectancy). Nevertheless, [7] found a contradiction. Their results showed non-

significant relationship between social influence and performance expectancy. The contradiction in the finding of this current study to that of [7] could be attributed to the fact that influence of important others is stronger on the participants of the current study because they are students; however, the participants of [7] were tutors and more independent. Hence, the tutors did not care much about the thoughts of important others.

The study found no significant relationship between facilitating conditions and performance expectancy. This finding is consistent with the result reported by [7]. Though their study focused on acceptance of Learning Management System by distance education tutors, they obtained a similar result. The explanation for this finding could be that at an early stage when a new technology is introduced to prospective users, availability of enabling conditions would not necessarily imply the users would perceive use of the technology to result in gains in job performance.

The study also revealed that facilitating conditions significantly determine effort expectancy. This finding is consistent with previous studies [10], [7]. Venkatesh tested the relationship between external control beliefs (similar to facilitating conditions) and perceived ease of use (similar to effort expectancy) using Technology Acceptance Model and found a significant and positive effect of external control beliefs on perceived ease of use. Likewise, [7] used the UTAUT model to test the non-linear relationship between facilitating conditions and effort expectancy, and they concluded that facilitating conditions significantly predict effort expectancy. The significant relationship between facilitating conditions and effort expectancy could be explained that when prospective users of a new technology perceive that the resources and conditions that will make the use of the technology are available, they tend to believe that using the technology will be effortless. Conversely, when a prospective user perceives that necessary resources and conditions for convenient use of a new technology are not available, the user will have the tendency to believe that using the technology will require more effort or even be difficult for him or her.

Again, facilitating conditions were found to significantly predict social influence in this current study. This finding is consistent with that of [7] in their study involving usage of Learning Management System by distance education tutors of a Ghanaian university. This relationship could be explained that during introduction of a new technology to potential users, when conducive environment and resources are available to support utilization of the technology, people who are important to the potential users would have the tendency to encourage the latter to adopt the technology. Hence, the more important others perceive availability of resources and conducive environment to support use of a new technology, the more they encourage potential users to adopt the technology.

The negative significant prediction of behavioral intention by mobile self-efficacy is quite an interesting finding in this study. It is an indication that distance education students who have stronger belief in their own ability to use mobile devices (higher mobile self-efficacy) have lower intention (i.e. are less likely) to accept WhatsApp technology for use in supporting their learning aside from scheduled face-to-face lecture sessions. Conversely, distance education students who have weaker belief in their own ability to use mobile devices (lower mobile self-efficacy) have higher intention (are more likely) to accept WhatsApp technology for use in supporting their learning.

The finding in this study that mobile self-efficacy is a significant negative predictor of behavioral intention is consistent with the findings of some previous studies [10], [6]. In a study to establish determinants of perceived ease of use (effort expectancy) in TAM3, [10] maintained that computer self-efficacy was an indirect predictor of behavioral intention fully mediated by perceived ease of use. That view implies that in the absence of mediating effect of effort expectancy, self-efficacy would not determine behavioral intentions; thus, significance of mobile self-efficacy in predicting behavioral intention is as a result of mediating effect of effort expectancy. Similarly, [6] postulated and empirically confirmed in the UTAUT model that self-efficacy does not have direct significant effect on behavioral intentions. The current study has contributed to the existing knowledge that in the adoption of WhatsApp chat for supporting distance learning, mobile self-efficacy is a significant determinant of behavioral intention of distance education students.

Conclusion

The main aim of the study was to validate non-linear relationships among exogenous constructs of the UTAUT model regarding acceptance of WhatsApp for supporting learning by higher distance education students. Also, a new construct; mobile self-efficacy; was assessed for its significance in predicting behavioral intention. The partial least squares structural equation modeling was used to test hypotheses. The results showed that effort expectancy and social influence are significant predictors of performance expectancy, mobile self-efficacy and facilitating conditions are significant predictors of effort expectancy, and facilitating conditions determine social influence. Mobile self-efficacy was also found to significantly predict behavioral intention for use of WhatsApp as a learning support tool.

Implications for Theory

The findings of the study have theoretical implications. They affirm existence of non-linear relationships among exogenous constructs of the UTAUT model. These non-linear relationships affirmed can be applied to better understand studies involving acceptance of technologies in variety of domains. Furthermore, this study has discovered that in studies involving adoption of mobile technologies, mobile self-efficacy is a significant factor. Therefore, the researchers recommend that in studies involving adoption of mobile technologies, the UTAUT model should be extended to include mobile self-efficacy.

Implications for Practice

The findings of the study have practical implications for faculty and administrators of distance education institutions. The finding that effort expectancy and facilitating conditions predict performance expectancy could be used as the basis to provide necessary resources and training that would make the target learners perceive the use of a novel technology to be easier. This would influence the potential users to perceive that they will be able to use the technology efficiently to maximize their job performance and subsequently be willing to accept the technology.

Limitations of the Study

The study excluded the moderating variables of the original UTAUT model. This eliminated understanding of how interactions between the exogenous and endogenous variables are influenced be the moderating variables.

Recommendations for future research

The researchers recommend that future researches on adoption of WhatsApp for supporting distance learning should include moderating variables such as gender, age and experience. This will hopefully help to understand how the moderators influence the relationships between the exogenous and endogenous variables, and hence extend existing knowledge on this subject.

References

[1] Smith, R. (2015). *The role of social media in higher education marketing.* Retrieved May 12, 2015 from http://www.bostoninteractive.com/blog/industries/socialmedia-higher-education-marketing.

[2] Fattah, S. F. E. S. A. (2015). The effectiveness of using WhatsApp messenger as one of mobile learning techniques to develop students' writing skills. Journal of Education and Practice, 6(32), 115-127.

[3] Vrocharidou, A., & Efthymiou, I. (2012). Computer mediated communication for social and academic purposes: Profiles of use and university students' gratifications. Computers & Education, 58(1), 609–616.

[4] Ogara, S., Koh, C., & Prybutok, V. (2014). Investigating factors affecting social presence and user satisfaction with mobile instant messaging. Computers in Human Behavior, 36(2014), 453–459.

[5] Cifuentes, O., & Lents, N. (2010). Increasing student-teacher interactions at an urban commuter campus through instant messaging and online office hours. Electronic Journal of Science Education, 14(1), 1–13.

[6] Venkatesh V., Morris M., Davis G. & Davis F. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly. 27(3), 425-478. DOI: 10.2307/30036540.

[7] Bervell, B. & Umar, I. N. (2017). Validation of UTAUT model: re-considering non-linear relationships of exogeneous variables in higher education technology acceptance research. EURASIA Journal of Mathematics Science and Technology Education, 13(10), 6472-6490. DOI: 10.12973/eurasia.2017.01078a.

[8] Davis, F. D. (1986). Technology acceptance models for empirically testing new end-user

information systems: theory and results. Cambridge: MIT Sloan School of Management.
[9] Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37, 122-147.
[10] Venkatesh, V. (2000). Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research,* 11(4), 342-365.
[11] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Management Science, 35(8), 982-1003.
[12] Venkatesh, V. & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), 186-204. http://dx.doi.org/10.1287/mnsc.46.2.186.11926.
[13] Nikou, S. A., and Economides, A. A. (2017). Mobile-based assessment: investigating the factors that influence behavioral intention to use. Comput. Educ.109, 56–73. DOI: 10.1016/j.compedu.2017.02.005.
[14] Bandura, A. (1986). Social foundations of thought and action: a social cognitive theory: Prentice Hall, Englewood Cliffs, NJ.
[15] Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607-610.
[16] Evans, N. D. (2013). Predicting user acceptance of electronic learning at the University of Zululand. Unpublished Thesis. Department of Information Studies, University of Zululand, South Africa.
[17] Chao C-M (2019) Factors determining the behavioral intention to use mobile learning: an application and extension of the UTAUT model. Frontiers in Psychology, 10(1652), 1-14. DOI: 10.3389/fpsyg.2019.01652.
[18] Ringle, C. M., Wende, S., and Becker, J.-M. (2015). "SmartPLS 3." Boenningstedt: SmartPLS GmbH, http://www.smartpls.com.
[19] Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). A primer on partial least squares structural equation modeling. 1st Edition. Thousand Oaks: Sage.
[20] Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. J. of the Acad. Mark. Sci. 43, 115–135. DOI: 10.1007/s11747-014-0403-8.
[21] Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling. 2nd Edition. Thousand Oaks: Sage.
[22] Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration, 11(4), 1-10.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art005

Financial and Non-Financial Incentives to Improve Performance and the Quality of Health care in Hadiya zone, SNNPR, Ethiopia

Derebe Tadesse Kintamo
PhD in Management, Texila American University, Ethiopia
E-mail: tderebe@gmail.com

Abstract

Human resources for health are key for delivery of health care services. According to WHO's 2006 World Health Report, Ethiopia had 0.247 doctors, nurses and midwives combined per 1,000 population, and was one of the 57 countries with health workforce crisis. International Non-Governmental Organizations and International agencies utilizes financial and non-financial incentive to retain experienced health workers to deliver health services for targeted population. This study employed health facility based cross sectional survey. Quantitative and qualitative data collection techniques was used to gather primary information using tools. The study was conducted in the selected health facilities in Hadya zone, Southern Nations and Nationalities Region, Ethiopia. In Hadiya zone, there were 13 rural districts and 4 town administrations. The study targeted 4 rural districts selected randomly and all 4 town administrations. All health professionals who were working in the public health sector targeted for the study. The research aim was to examine the relationship between financial and non-financial incentives and health workers performance and quality of health care. This study found that 64.1% (Male 59.3%%; Female 66.7) respondents reported that both financial and non-financial incentives were equally important to improve health workers performance and motivation in provision of quality of health care services. This clearly indicated that the importance of non-financial incentives on the top of financial incentive to motivate Health Workers for better performance and quality of health care.

Keywords: *Financial and non -financial Incentives, Health workers performance, Quality of health Care, Satisfaction of workers on Fridge Benefits.*

Introduction

According to WHO 2006 report, Ethiopia is one of the countries in the world with low health workforce density of 0.7/1000 population, which is far below the minimum threshold density of 2.3 health workers (MD, nurses & Midwives) per 1000 population for countries to achieve essential services (a targeted 80% coverage rate for skilled birth attendance). In the African region, the average threshold is 1.6 of doctors, nurses & Midwives per 1000 population. In the last two decades, an increasing number of developing countries have introduced incentive payments linked to results to widen access to care and to improve the quality and performance of health care services and systems. These incentive schemes, known collectively as Performance-based financing (PBF), play an important role in advancing progress toward universal health coverage, contributing to the achievement of the Sustainable Development Goals.

For over a decade, the World Bank's strategies have emphasized the importance of paying for results approaches to expanding access to and improving health care services. The World Development Report 2004; Making Services Work for Poor People lists weak incentives for health providers as one of the drivers of poor-quality service, leading to low demand for health services. To address such barriers to service delivery, the report recommended the creation of incentives for better quality service and strengthening accountability. A continued misalignment between health service providers' compensation and key system goals drives the failure to deliver efficient and effective services for populations despite many efforts in the last decade to improve quality and performance.

As many countries change governance principles of their health systems from rules and regulations toward devolved, results driven systems that emphasize strategic planning and decision making oriented towards performance, they have realized that success requires individuals and organizations in the system have an incentive to act on information and use their capacities to meet the health system goals. The term incentive means an inducement, which rouses or stimulates one to action in a desired direction. An incentive has a motivational power;

many incentives, the modern organizations use to motivate their employees may be broadly grouped into (i) financial incentives, and (ii) non-financial incentives.

Financial incentive -Money is an important motivator. Common uses of money as incentive are in the form of wages and salaries, bonus, retirement benefits, medical reimbursement, etc. Management needs to increase these financial incentives making wages and salaries competitive between various organizations to attract and hold work force. In any organization, the financial capability of employees is a very important factor as it determines the level or the extent to which he or she is motivated to expend his/her effort on the job performance. Non-financial incentives do not involve money payments. These are also important in motivating employees as they bring in psychological and emotional satisfaction to them. These include so many techniques. People do work for money-but they work even more for meaning in their lives. Some of the important non-financial incentives include recognition, Better job titles, empowerment, competition and job rotation etc.

Limitation of this research was it only focused on financial and non-financial incentives for improving performance and quality of care but other determinants for health care quality was not included in this study. The reason is that incentive alone can't represent for quality of care improvement, there are other factors that may affect quality of care such as working environment, infrastructure, pharmaceuticals and other supplies availability. This study focused on 82 health facilities in Hadiya zone, South Nations, Nationalities and People Region (SNNPR), Ethiopia. This may limit generalizing the finding of the study.

Therefore, this study found out that to maintain required health work force in the health facilities, the management should focus both on financial and non-financial incentives strategically link in to their performance objectives.

Methodology

This study was conducted in Hadiya zone, South Nations Nationalities and peoples Region, Ethiopia. In this study, the researcher employed a cross-sectional survey design to quantitatively assess the relationship between the financial and non-financial incentives, employee performance and quality of health care improvement using a questionnaire. Key informant interview was conducted with facility and district managers to get detailed qualitative information on how and why of the financial and non-financial incentives contribution for improved performance and quality of health care services. According to Creswell (2014) and Sekaran (2016) quantitative research is an approach for testing objective theories by examining the relationship among variables. According to him these variables in turn can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures.

According to the information obtained from the zonal health department, the total number of the target population (different cadre of health workers) in the study area were 2,533. This figure includes all kinds of health cadres (doctor, Nurses, Midwifes, Health officers, Pharmacist, laboratory technicians, Health Extension workers etc). To determine the sample size for this study, three key factors such as confidence interval (it is also called level of precision or sampling error), confidence level, and the population size were considered.

$$n = \frac{N}{1 + N (e)^2}$$

- Where 'n' is the sample size, 'N' is the population size, and 'e' is the level of precision/ Confidence interval.
- The study considered a 95% confidence level and a 5% confidence interval. Using the above portrayed statistical formula, the sample

$$n = \frac{2533}{1 + 2533 (.05)^2} = 345$$

5% non-responders in case of absence at the work station during data collection is 17

Therefore, the sample size for targeted population of this study was **362** employees.

Data collection was conducted by the trained data collectors using closed ended questionnaires distributed to the randomly selected sample of individual employees of ministry of health of Ethiopia working in Hadiya zone and collected physically from respondents at their site by the researcher and trained data collectors. Qualitative data was collected using Key Informant Interview guide by the researcher and trained data collector. The qualitative information was collected from health facility and district/Woreda health department managers in view of getting detailed information on how and why of the financial and non -financial incentives for health workers and its impact on performance improvement and quality of care.

The quantitative data collected by the structured individual questionnaire was cleaned and edited and responses to open ended questions were coded. Then the data were entered into the computer using CSPro (Census and Survey Processing) software. Following the completion

of the entry, the raw data were transformed to SPSS version 26 readable format for easy manipulation and processing as well as further analysis.

Then Health providers' survey data were analyzed using appropriate statistical techniques such as logistics regression and Descriptive statistics (frequencies, cross tabulations and charts) were used to identify the association between financial and non-financial incentives and the performance and quality of health care. Moreover, factor analysis also used to identify scaled constructs.

Qualitative data was analyzed by formulation of stories presented by respondents considering context of each case and different experiences of each respondent. The respondent's key points and related comments were analyzed and incorporated in the research findings.

Reliability tested using Cronbach 's alpha values for the items in each construct carried out. According to Sekaran and Bougie (2016) reliabilities less than 0.60 are poor, those in the 0.70 range, acceptable, and those over 0.80 good. Based on the above recommendation the reliability test done for this study using Cronbach's alpha values for items in each construct is more than acceptable.

Results

In total 362 questionnaires were distributed to 82 health facilities (3 hospitals, 18 Health centers and 61 Health posts). Out of 362 distributed questionnaires,354 questionnaires completed with response, which is 97.8% of the targeted respondents. Non- respondents were 8 which is 2.2% only.

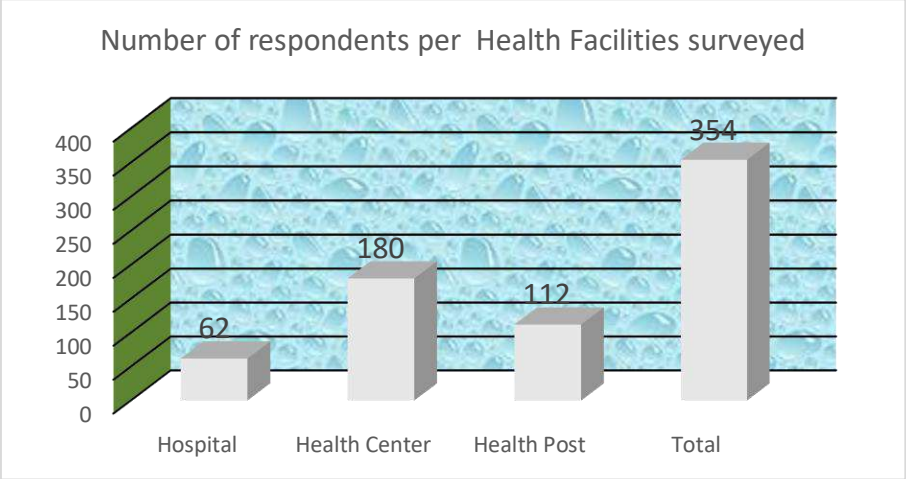

Figure 1. Number of respondents per facilities

Table 1. Sex of the respondents

Demographic Characteristics		Sex		Total
		Male	Female	
Sex	Number	123	231	354
	%	34.7%	65.3%	100.0%

From the above table 34.7% were males and 65.3% were female

Table 2. Age structure of the respondents

Age group		Male	Female	Total
20-24	Number	8	9	17
	%	6.5%	3.9%	4.8%
25-29	Number	53	98	151
	%	43.1%	42.4%	42.7%
30-34	Number	40	98	138
	%	32.5%	42.4%	39.0%
35-39	Number	12	16	28
	%	9.8%	6.9%	7.9%

40-44	Number	10	9	19
	%	8.1%	3.9%	5.4%
45+	Number	0	1	1
	%	0.0%	.4%	.3%

42.7% of respondents were between the ages of 25 to 29 years, Whereas, 39% of respondents belongs to the age range of 30 to 39 years.

Table 3. Marital Status of the respondents

Marital Status		Male	Female	Total
Married	Number	49	142	191
	%	39.8%	61.5%	54.0%
Living in union	Number	3	5	8
	%	2.4%	2.2%	2.3%
Divorced	Number	0	1	1
	%	0.0%	.4%	.3%
Never married/never in union	Number	71	83	154
	%	57.7%	35.9%	43.5%
Total	Number	123	231	354
	%	100.0%	100.0%	100.0%

54% (Male 39.8%; Female 61.5%) respondents were married and never Married/never in union are 43.5% (Male 57.7%; Female 35.9%) of respondents.

Table 4. Educational status of the respondents

Educational status		Sex		Total
		Male	Female	
Primary	Number	2	0	2
	%	1.6%	0.0%	.6%
Technical/vocational	Number	3	18	21
	%	2.4%	7.8%	5.9%
Higher education (college diploma)	Number	54	162	216
	%	43.9%	70.1%	61.0%
Higher education (First Degree)	Number	63	51	114
Higher education (Second Degree)	%	51.2%	22.1%	32.2%
	%	.8%	0.0%	.3%

Above table shows 61% (Male 43.9%; Female 70.1%) of respondents attended higher education (college diploma) with significant number of female respondents. When it comes to Higher education (first degree) level 32.2% (Male 51.2%; Female 22.1%) of respondents attended with higher number of Male.

Table 5. Professional Category of the respondents

Profession		Male	Female	Total
Medical Doctor	Number	7	2	9
	%	5.7%	.9%	2.5%
Nurse	Number	49	49	98
	%	39.8%	21.2%	27.7%
Health Officer	Number	26	20	46
	%	21.1%	8.7%	13.0%
Midwife	Number	6	22	28

	%	4.9%	9.5%	7.9%
Laboratory Technician	Number	8	9	17
	%	6.5%	3.9%	4.8%
Pharmacist/ Druggist	Number	8	5	13
	%	6.5%	2.2%	3.7%
Health Extension worker (HEW)	Number	3	111	114
	%	2.4%	48.1%	32.2%
Others	Number	16	13	29
	%	13.0%	5.6%	8.2%

Above table shows 32.2% of the respondents are HEW followed by 27.7% Nurses. Respondents in professional categories like Medical doctors were 2.5%.

Table 6. Responders years of services in current profession

Number of Years in current profession		Male	Female	Total
Less than 2 years	Number	22	30	52
	%	17.9%	13.0%	14.7%
2 up to 5 years	Number	52	92	144
	%	42.3%	39.8%	40.7%
6 up to 10 years	Number	37	62	99
	%	30.1%	26.8%	28.0%
11 up to 20 years	Number	4	37	41
	%	3.3%	16.0%	11.6%
More than 20 years	Number	8	10	18
	%	6.5%	4.3%	5.1%
Total	Number	123	231	354
	%	100.0%	100.0%	100.0%

In the above table, almost 40.7% of respondents served in their current professional categories for 2-5 years. The percentage of respondents 'years of services in the current position for 11-20 years was only 11.6%, whereas more than 20 years was only 5.1% which indicates that HWs were migrating from the rural and relatively rural towns after few years of services, most probably after finishing the obligation entered by the government as part of educational expenses cost sharing.

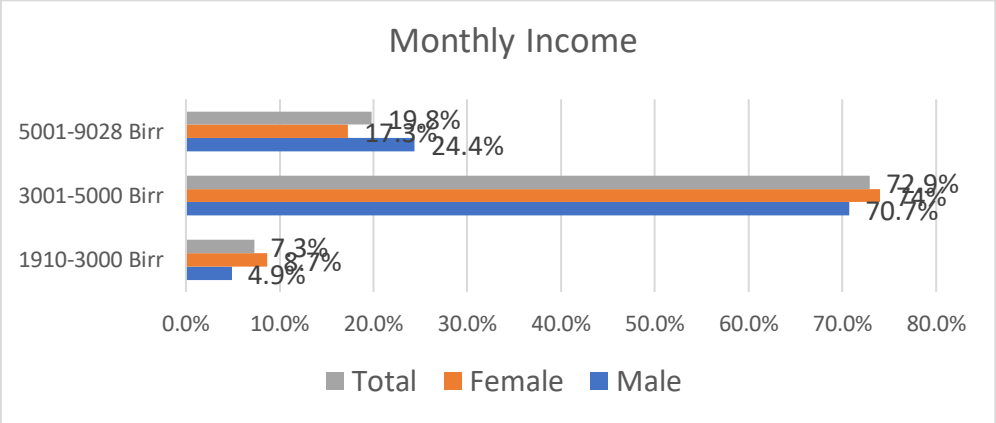

Figure 2. Responders monthly income

In the above figure, most of the respondents (72.9%) monthly income falls in the range of 3001-5000 Ethiopian birr. Only 19.8% of the respondents getting monthly income in a range of 5001-9028 Ethiopian birr.

Table 7. Effectiveness of financial and non-financial incentives on employees' performance and quality of health care provision

Motivational factors		Sex		Total
		Male	Female	
Financial or monetary benefits	Number	39	64	103
	%	31.7%	27.7%	29.1%
Non-financial or non-monetary benefits	Number	11	13	24
	%	8.9%	5.6%	6.8%
Both	Number	73	154	227
	%	59.3%	66.7%	64.1%

In the above table, most of the respondents 64.1% (Male 59.3%%; Female 66.7) reported that both financial and non-financial incentives were equally important to improve HWs performance and motivation in provision of quality of health care for people in need. 29.1% of respondents reported that financial or Monetary benefits motivates Health workers for better performance. Whereas 6.8% of the respondents reported that non-financial or non-monetary benefits motivate HWs for better performance.

Table 8. Responders rate of financial incentives

Rate of financial incentive		Male	Female	Total
Very good	Number	18	26	44
	%	14.6%	11.3%	12.4%
Good	Number	33	57	90
	%	26.8%	24.7%	25.4%
Fair	Number	36	72	108
	%	29.3%	31.2%	30.5%
Bad	Number	34	65	99
	%	27.6%	28.1%	28.0%
Very bad	Number	2	3	5
	%	1.6%	1.3%	1.4%
discouraging	Number	0	8	8
	%	0.0%	3.5%	2.3%
Total	Number	123	231	354
	%	100.0%	100.0%	100.0%

Above table shows ,30.5% of respondents rate the current financially incentive is fair, 25.4% good and 12.4% very good. 28.1% respondents' rate financial incentive is bad, 1.4% very bad and 2.3% discouraging. This indicates dissatisfaction of the HWs with current financial incentives. Respondents who rated very good is only 12.4%, this significantly show that majority of HWs were not happy with the incentives provided by the employer.

Table 9. Respondents beliefs on financial incentives alone to motivate for better performance and quality of health care services delivery

Respondents believe financial incentive alone motivates for better performance		**Sex**		**Total**
		Male	**Female**	
Yes	Number	46	76	122
	%	38.7%	36.0%	37.0%
No	Number	73	135	208
	%	61.3%	64.0%	63.0%
Total	Number	119	211	330
	%	100.0%	100.0%	100.0%

Table 9 shows ,63% of the respondents believe that financial incentives alone can't motivate for better performance. This clearly indicated that the importance of non-financial incentives on the top of financial incentive to motivate HWs for better performance and quality of health care services delivery. 37% of the respondents believe only financial incentives alone can motivate for better performance and quality of health care provision.

Table10. Respondents perception on management leadership style

Respondents perception on the management leadership style		**Sex**		**Total**
		Male	**Female**	
Very good	Number	16	29	45
	%	13.0%	12.6%	12.7%
Good	Number	61	95	156
	%	49.6%	41.1%	44.1%
Fair	Number	39	73	112
	%	31.7%	31.6%	31.6%
Bad	Number	7	31	38
	%	5.7%	13.4%	10.7%
Very bad	Number	0	3	3
	%	0.0%	1.3%	.8%
Total	Number	123	231	354
	%	100.0%	100.0%	100.0%

Table 10 shows, almost 56.8% of the respondents perceived that the management leadership style was good to very good and 31.6% of respondents perceived as fair, where 11.5% perceived the management style was bad to very bad. The Key informant interview participants also indicated that management leadership style was one of the important factors for key HWs retention and better performance.

Table 11. Perception of respondents on Employees Performance increase through Motivation trends.

Motivation increase Employees performance		**Sex**		**Total**
		Male	**Female**	
Always	Number	27	46	73
	%	22.0%	19.9%	20.6%
Occasionally	Number	60	122	182
	%	48.8%	52.8%	51.4%
Not at all	Number	36	63	99
	%	29.3%	27.3%	28.0%

Table11 shows ,51.4% of respondent's perception on employee's performance increase through motivation was an occasional trend, where as 28% of respondents perceived that employees were not at all motivated. Only 20.6% of respondents were perceived HWs were motivate always.

Table 12. Response on the type of in-service training

Training type		**Male**	**Female**	**Total**
On - the - job training	Number	30	67	97
	%	24.4%	29.0%	27.4%
Off - the - job training	Number	24	66	90
	%	19.5%	28.6%	25.4%
None	Number	68	94	162
	%	55.3%	40.7%	45.8%
Others, specify	Number	1	4	5
	%	.8%	1.7%	1.4%

Above table shows,45.8% of the respondents attended none of the in-service training in last one year, whereas 27.4% of respondents attended on the job training and 25.4% of respondents attended off-the-job training.

Table 13. The significance of the incentive provided and effect towards performance improvement

Has the incentive provided had significant effect towards performance improvement?		**Male**	**Female**	**Total**
Yes	Number	107	206	313
	%	87.0%	89.2%	88.4%
No	Number	16	25	41
	%	13.0%	10.8%	11.6%
Total	Number	123	231	354
	%	100.0%	100.0%	100.0%

Table 13 shows ,88.4% of the respondents say 'yes' the incentive provided had significant effect towards performance improvement, where as 11.6% of respondents says 'no' the incentive provided has no significant effect toward performance improvement.

Table 14. Reasons of People's work beyond getting Money

People work for		**Sex**		**Total**
		Male	**Female**	
Recognition	Number	30	65	95
	%	24.4%	28.1%	26.8%
Achievement	Number	74	106	180
	%	60.2%	45.9%	50.8%
job challenge	Number	15	46	61
	%	12.2%	19.9%	17.2%
Don't know	Number	4	14	18
	%	3.3%	6.1%	5.1%
Total	Number	123	231	354
	%	100.0%	100.0%	100.0%

Table 14 shows ,50.8% of respondents were working for achievements, where as 26.8% of respondents works for recognition and 17.2% for Job challenges beyond getting money.

Table 15. Satisfaction of respondents with the fringe benefits (Medical care, pension scheme, Housing benefits, lunch subsidy, Transport allowance) offered

Are you satisfied		**Sex**		**Total**
		Male	**Female**	
Yes	Number	32	63	95
	%	26.0%	27.3%	26.8%
No	Number	91	168	259
	%	74.0%	72.7%	73.2%

Table 15 shows, 73.2% of respondents were not satisfied with the benefits (medical, pension scheme, Housing benefits, lunch subsidy, Transport allowance) offered, whereas only 26.8% of the respondents were satisfied with the fringe benefits provided.

Table 16. Type of benefits that respondents are not satisfied

The benefits respondents are not satisfied with		**Male**	**Female**	**Total**
Medical care	Number	31	60	91
	%	34.1%	35.7%	35.1%
pension scheme	Number	4	9	13
	%	4.4%	5.4%	5.0%
Housing benefits	Number	30	60	90
	%	33.0%	35.7%	34.7%
Lunch subsidy	Number	0	1	1
	%	0.0%	.6%	.4%
Transport allowance	Number	23	32	55
	%	25.3%	19.0%	21.2%
Others, specify	Number	3	6	9
	%	3.3%	3.6%	3.5%
Total	Number	91	168	259
	%	100.0%	100.0%	100.0%

Above table shows that the benefits respondents were not satisfied include medical, housing and transport allowances, presented as 35.1%, 34.7%, and 21.2% respectively.

Table 17. Mean score of Perception of Respondents on Health facilities performance

Variables	Cronbach's Alpha	Mean Score
Workers will still perform very well even if their salary is delayed by week	.455	2.67
Workers' welfare should be a paramount issue of concern to top management who wish to have higher productivity.	.341	3.55
Monetary rewards only can bring best in workers performance	.632	3.13
Inter-Personal relationship between top management and staff should be encouraged	.541	4.25
Rewarding good work and excellence can contribute to more excellence and healthy competition	.498	4.18

As per the above table, respondents were slightly disagreed that health workers will still perform very well even if their salary was delayed by week. On the other hand, respondents were slightly agreed that workers' welfare should be a paramount issue of concern to top management who wish to have higher productivity. Respondents also slightly agreed that monetary rewards only can bring best in workers performance. Most of the respondents strongly agreed that inter-personal relationship between management and staff and reward good work and excellence can contribute to more excellence and health competition which can lead to better performance. This indicated that good inter-personal relationship between management and employee will facilitate employees' performance in the form of motivation and rewarding good work in any form including recognition and thank giving through certificate will improve employee's performance.

Table 18. Mean score of perceptions of Respondents on Health facilities quality of health care

Variables	Cronbach's Alpha	Mean Score
I can participate in "setting goals" which are related to my job and main factor for better quality of health care provision for the clients.	.647	3.71
There are opportunities to use my abilities to do tasks differently for quality health care services delivery and better results	.673	3.67
I have freedom to take decisions (job task, its timing, and required resources) in relation to my role, which makes me more productive in delivering quality health care services	.643	3.47
Management is engaging in delivering training programs for employees to improve skills and knowledge of their job for better quality health care service delivery.	.682	3.50
I am happy and motivated to perform better and encouraged to improve quality of health care services when I receive non-financial rewards in different forms including recognition	.698	3.51
I am happy and motivated to perform better and encouraged to improve quality of health care services when I receive better financial rewards	.735	4.32
I am happy and more engaged when I receive both financial and non-financial rewards to improve quality of health care services.	.709	4.23

In the above table, respondents are agreed that participating in "setting goals" which were related to their job was main factor for better quality of health care provision for the clients. Respondents also agreed if they were given opportunities to use their abilities to do tasks differently for quality health care services delivery and better results. Respondents agreed that if they have freedom to take decisions (job task, its timing, and required resources) in relation to their role, which makes them more productive in delivering quality health care services. Respondents greed if Management was engaged in delivering training programs for employees to improve skills and knowledge of their job for better quality health care service delivery. Respondents agreed that they would be happy and motivated to perform better and encouraged to improve quality of health care services when they receive non-financial rewards in different forms including recognition. Respondents are strongly agreed that they would be happy and motivated to perform better and encouraged to improve quality of health care services when they received better financial rewards. Respondents were strongly agreed that they would l be happy and more engaged when they received both financial and non-financial rewards to improve quality of health care services.

Table 19. Respondents fringe benefits satisfaction by Demographic Characteristics

Demographic Characteristics			Are you satisfied with the fringe benefits (Medical care, pension scheme, Housing benefits, lunch subsidy, Transport allowance) offered	
			Yes	No
Sex	Male	Number	32	91
		%	26.0%	74.0%
	Female	Number	63	168
		%	27.3%	72.7%
Age group	20-24	Number	1	15
		%	6.3%	93.8%
	25-34	Number	79	209
		%	27.4%	72.6%
	35-49	Number	14	34
		%	29.2%	70.8%
Marital Status	Married	Number	52	139
		%	27.2%	72.8%
	Living in union	Number	0	8
		%	0.0%	100.0%
	Divorced	Number	0	1

		%	0.0%	100.0%
	Never married/never in union	Number	43	111
		%	27.9%	72.1%
Total		Number	95	259
		%	26.8%	73.2%

Above table shows that there is no significant satisfaction difference based on the demographical characteristics except few differences in female verses male and age group from 25-34 years. This means dissatisfaction on fridge benefits reflected uniformly despite different demographic characteristics.

Table 20: Respondents' fringe benefits satisfaction by Socio Economic Characteristic

Socio economic Characteristics			**Are you satisfied with the fringe benefits (Medical care, pension scheme, Housing benefits, lunch subsidy, Transport allowance) offered**	
			Yes	No
Education	Primary	Number	0	2
		%	0.0%	100.0%
	Technical/vocational	Number	1	20
	Higher education (college diploma)	Number	60	156
		%	27.8%	72.2%
	Higher education (First Degree)	Number	34	80
		%	29.8%	70.2%
	Higher education (Second Degree)	Number	0	1
		%	0.0%	100.0%
Profession	Medical Doctor	Number	1	8
		%	11.1%	88.9%
	Nurse	Number	36	62
		%	36.7%	63.3%
	Health Officer	Number	5	41
		%	10.9%	89.1%
	Midwife	Number	7	21
		%	25.0%	75.0%
	Laboratory Technician	Number	2	15
		%	11.8%	88.2%
	Pharmacist/ Druggist	Number	1	12
		%	7.7%	92.3%
	Health Extension worker (HEW)	Number	29	85
		%	25.4%	74.6%
	Others	Number	14	15
		%	48.3%	51.7%
Monthly Income	1910-3000 Birr	Number	5	21
		%	19.2%	80.8%
	3001-5000 Birr	Number	52	206
		%	20.2%	79.8%
	5001-9028 Birr	Number	38	32
		%	54.3%	45.7%
Total		Number	95	259
		%	26.8%	73.2%

Above table shows that respondents' fringe benefit satisfaction by socio economic characteristics was not significantly linked. Even the monthly income indicated weak satisfaction.

Table 21. Logistic Regression analysis of incentive factors that determine performance improvement and quality of care

Independent variables	Sig.	Exp(B)
Workers obtained Low salary (workers obtained high salary [R])	0	5.516
People do not work only for money but work for other reasons (Job challenge [R])	0.045	
Recognition	0.005	2.871
Achievement	0.005	4.772
Satisfied with the fringe benefits provided (Are not satisfied with the fringe benefits provided (R)	0.003	0.201

Above table reveals those employees who have obtained low salary (below the average salary of workers) believe that incentives provided as motivation to workers had significant effect towards performance improvement 5.5 times more likely than those obtained high salary. In terms of purpose of people work, employees who said people are working not only for money but also for recognition and achievement believed that incentives provided as motivation to workers had significant effect towards performance improvement 2.87 and 4.77 times respectively more likely than those who said for job challenge. On the other hand, those employees who are satisfied with the fringe benefits offered by their health facility believed that incentives provided as motivation to workers had significant effect towards performance, 20 percent less likely than those who are not satisfied by the fringe benefits.

Discussion

Incentives can play a role in providing a means by which health systems can attract and retain essential and highly sought-after health care professionals. Effective incentive schemes also help to build a better motivated, more satisfied and better performing health workforce. In general, the qualitative and qualitative information collected and analyzed indicated that systematically planned and balanced financial and non-financial incentives were key for improving quality of health services delivery in the public health facilities. As these facilities supporting the health care need of most of the people in the country, it must have conducive environment for health workers attending the health of the community with all kind of benefit packages to motivate and retain them. If motivated key staff in place, the health care system would be able to deliver the quality health care for the people in need.

The key informant participants mentioned that incentive in monetary form is very important to cover the cost of living where as non-financial incentive need to be added in balanced manner for the HWs who committed his/her time in delivering health care services differently than the other fellow colleagues in the organization. Choosing the right incentive package requires a consideration of both the effects of different packages on employee choices and the cost of those packages.

An incentive programme represents a substantial investment for most organizations. Receiving a sufficient return on that investment requires the full participation of the programme participants. Incentive programmes should be based upon the concept that effort increases people perceptions progressing towards their goal. Therefore, programs should offer participants a variety of incentive packages based on their unique interests and diverse needs. Successful programs need to develop their reward methods carefully to keep participants eager to approach a goal to receive intended reward. Workers in general (even the most dedicated) thrive on constant encouragement, effective rewards and suitable recognition.

Conclusion

Rewards tend to motivate people to do more and to do it better or continue to do it better. Without rewards, workers tend to lose interest in excelling and innovation. As some interviewees have stated, in this sense incentive can be considered as a "right compensation" for HWs working in difficult context, without resources (Pharmaceuticals and infrastructure), tools and adequate facilities and career opportunities. Incentives also contribute to reduce the brain drainage of HW from Ethiopia to other countries. The brain drainage often due to a chance of better salary, career opportunities and better living conditions. If health workers received adequate

salary in their country they are less willing to leave their country.

During the discussion on incentive mechanisms some health managers mainly referred to the financial incentives. But HWs interviewed have underlined the important of non-financial incentives. The word recognition had a lot of importance among HWs, they asked recognition for their work and more when there were working in rural and remote areas of Ethiopia. This has been indicated in the WHO user guide for HRH in rural and remote areas. A good incentive mechanism includes both financial and non-financial incentives to be positive and useful to the empowerment of HWs in improving performance and quality of health care services.

References

[1] Kidane Mariam, W. & Moen, A. (1972). Government health services in Ethiopia and the role of medical graduates in it. Ethiopian-Medical Journal, PO, 117-13

[2] Health Extension Programme: An Innovative Solution to Public Health Challenges of Ethiopia. A Case Study, USAID.

[3] Yayehyirad Kitaw, Yemane Ye-Ebiyo, Amir Said, Hailay Desta, and Awash Teklehaimanot, "Assessment of the Training of the First Intake of Health Extension Workers", (2007). The Ethiopian Journal of Health Development, 21 (2007), pp. 232 – 239

[4] "Global distribution of health workers in WHO Member States" (2008). The World Health Report 2006. World Health Organization.

[5] Macro International Inc. (2008). Ethiopia Atlas of Key Demographic and Health Indicators, 2005." (Calverton: Macro International.

[6] Conacher, D.G. (1976). "Medical care in Ethiopia". Transactions of the Royal Society of Tropical Medicine and Hygiene. **70** (2): 141–144. doi:10.1016/0035-9203(76)90176-0.

[7] The Ethiopia Sixth Health Accounts (2013/14): Statistical Report Health Insurance (CBHI, SHI), Publications; https://www.hfgproject.org/ethiopia-sixth-health-accounts-201314-statistical-report/ https://web.archive.org/web/20181220231759/ http://www.moh.gov.et/

[8] National Human resource for health strategic plan for Ethiopia 2016–2025

[9] Ministry of Health. (2010). Health sector development program IV 2010/11-2014/15. (). Addis Ababa, Ethiopia: Federal Democratic Republic of Ethiopia.

[10] The Health Extension Programme in Ethiopia. The World Bank, Washington DC, January 2013;

[11] Transforming Health Care in Ethiopia: An Interview with Dr. Tedros Adhanom Ghebreyesu". (2013). Boston Consulting Group.

[12] EVALUATION OF HEP (2010). Implementation process and effect on health outcomes VOLUME IV: SUPPORT AND MANAGEMENT OF HEP, RURAL ETHIOPIA.

[13] Institute of Medicine (2001). Crossing the quality chasm: A new healthcare system for the twenty-first century Washington, DC: National Academies Press.

[14] Midwest Business Group on Health (2002). Reducing the costs of poor-quality health care through responsible purchasing leadership Chicago, IL: Mid-west Business Group on Health.

[15] Pink GH, Brown AD, Stutter ML, Reiter KL, Leatt P (2006). Pay-for-Performance in publicly financed health care: some international experiences and considerations for Canada. Healthcare Papers, 6:8-26.

[16] Bossert T (1998). Decentralization of health systems: decision space, innovation, and performance. Soc Sci Med, 10:1513-1127.

[17] Saltman R, Bankauskaite V (2006). Conceptualizing decentralization in European health systems: a functional perspective. Health Economics, Policy and Law, 1:127-147.

[18] Saltman R, Bankauskaite V (2006). Conceptualizing decentralization in European health systems: a functional perspective. Health Economics, Policy and Law, 1:127-147.

[19] Herzberg, F., (1968). One more time: how do you motivate employees? Harvard Business Review, Vol 46, Issue 1

[20] Hotchkiss, D.R., Banteyerga, H. & Tharaney, M. (2015). Job satisfaction and motivation among public sector health workers: evidence from Ethiopia. Hum Resource Health 13, 83 (2015) doi: 10.1186/s12960-015-0083-6.

[21] Vroom, V. H. (1964). Work and Motivation. New York: John Wiley.

[22] Brewer, D. J., & Picus, L. O. (Eds.). (2014). Encyclopedia of Education Economics and Finance. SAGE Publications.

[23] Herzberg, F., Mausner, B., Peterson, R., & Capwell, D. (1957). Job attitudes: Review of research and opinion. Pittsburg: Psychological Service of Pittsburg.

[24] Herzberg, F. (1966). Work and the nature of man. Cleveland: World Publishing.

[25] Herzberg, F. (1968). One more time: How do you motivate your employees? Harvard

[26] Value Based Management.net. 2016. Retrieved from http://www.valuebased management.net/methods_herzberg_two_factor_theory.html.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art006

Features of Problem Based Learning Lesson Plan That Fits into the Realities in the Teaching and Learning of Mathematics for Pre-service Teachers in Ghana

Eric Sefa Boye
PhD, School of Education, Texila American University, Guyana
E-mail: boyesefa@yahoo.com

Abstract

The traditional method of teaching Mathematics has been criticised by researchers as learner passive paving the way for Problem Based Learning (PBL) strategy into the teacher education curriculum in Ghana. This development has aroused concerns about the effectiveness of lesson plans designed for teaching using the traditional method. Consequently, the introduction of a PBL lesson plan that is learner-centred, interactive, and involves the cooperation of learners in small group activities has become indispensable. The study seeks to determine the features of the PBL lesson plan that fits into the realities in the teaching and learning of Mathematics for pre-service teachers at the colleges of education in Ghana. The methodology employed in this study involved a literature review of a traditional lesson plan for pre-service teachers in Ghana alongside a proposed PBL lesson plan for pre-service teachers through a qualitative analysis before the enactment of the instructional process. The result and discussions of the two lesson plans placed the PBL lesson plan as a more constructive and a deeper reflection of the three domains of learning (cognitive, affective, and psychomotor) which are crucial in stating instructional objectives and for teaching Mathematics. The paper recommended that the PBL strategy should be integrated into the teacher education curriculum in Ghana since its features better fit into the realities in Mathematics education in Ghana.

Keywords: *Problem based learning, Traditional Teaching method, Lesson plan, Pre-service teachers, and Mathematics education.*

Introduction

The teaching and learning of Mathematics are a process and not an event. The process requires competent tutors with appreciable pedagogical skills to be able to deliver Mathematics contents effectively to shape the cognitive, affective and psychomotor skills of pre-service teachers. A tutor's in-depth understanding of a subject matter is not singlehandedly a panacea for effective teaching. The ability of a tutor to deliver content to a group of learners requires a structured approach guided by a lesson plan artefact. This lesson plan has been widely acclaimed as a mandatory tool if one wants to trek the path of teaching and learning according to researchers.

Largely, it is accepted in the teaching and learning process that lesson plan helps the teaching and learning process to be valuable and meaningful. On the contrary, an ill-prepared lesson plan results in unfocused and unproductive teaching and learning experiences. Many tutors generally believe that designing a lesson plan before an instructional process will lead to more effective teaching (Conkell and Imwold, 1992; Lederman and Niess, 2002). MacDonald and Phillips (2005) assert that planning a lesson allows the teacher to reflect on what to achieve and how best this can be done. A detailed lesson planning is important as it provides tutors the approach to better understand the content, student learning, and pedagogical content knowledge (Shen et al., 2007). Important to this is that lesson planning needs to focus on educational experiences that would stimulate learning than simply the delivery of content.

An instructional process in a formal classroom setting either takes the form of a teacher-centred or learner-centred approach. The teacher-centred approach describes a traditional method of teaching as against a learner-centred approach described as a problem-based learning

in the context of this paper. Research has revealed that these teachers use traditional methods in the teaching of Mathematics (Ampiah et al., 2004). Enu, J et al., (2015) conducted a study on the topic "factors influencing students' Mathematics performance in some selected colleges of education in Ghana". The study revealed that the expository approach of teaching Mathematics (just listening to teachers and copying notes from the board) was the major method of instruction by most tutors. The study revealed that 88% of Mathematics tutors use lecture method of instruction, 10% also use questioning and answering method of teaching whilst 2% use heuristic methods involving the use of small group discussion as the least methods of instruction (Enu et al., 2015).

Ghana Ministry of Education (2017) in a publication "The National Teacher Education Curriculum Framework" advocated for teachers to be competent in the use of different pedagogical strategies including project-based, enquiry based, and problem-based instructions and learning strategies, to meet the diverse needs and learning styles of learners. Irrespective of the kind of strategy to be employed and the level of content knowledge, the need for pre-service teachers to be exposed to how a typical lesson plan is prepared prior to an instructional process cannot be overlooked.

Problem based learning strategy reflects a social process in which students are engaged in dialogue and discussions (Hanley, 1994) and empowers teachers and students for critical thinking and creating changes in old teaching methods (Sawada, et al, 2002). Problem based learning (PBL) in Mathematics classrooms also fosters cooperation in small groups (Schmidt, et al, 2007). This effect could be achieved through a well-designed lesson plan that arranges and delivers content of a lesson coherently and confidently. The purpose of the paper is to examine the features of a typical PBL lesson plan relative to a typical lesson plan for a traditional Mathematics classroom at the colleges of education in Ghana. The paper briefly reviews literature on lesson plan and the domains of learning. It will then state the objective of the study, and the methodology employed in the study. Furthermore, it will compare a typical traditional lesson plan with a proposed PBL lesson plan. The paper also discusses the outcome of the comparison and finally makes recommendations.

Literature Review

This aspect of the paper will cover definitions and features of a lesson plan, and the three domains of learning. According to Scrivener (2005), planning a lesson involves imagining the lesson before it is enacted and this includes prediction, anticipation, sequencing, organising and simplifying. This planning could be unit planning, weekly planning and/or daily planning (Anderson, 1989). Anderson emphasised that the lesson plan which is planned daily is very significant for teachers. Woodward (2009) states that constructing a lesson plan and planning a lesson must take into consideration the learners, the contents to deliver, materials, and activities that could go into the lesson.

Amin (2010) defines a lesson plan as a set of planned activities in the learning process to reach a certain goal. A lesson plan is also considered as a blueprint, a guide map for action or a comprehensive chart of classroom teaching and learning activities (Aggarwal 2002). Aggarwal describes it as elastic but a systematic approach to the teaching of the concepts, skills, and attitudes. From the foregoing, a lesson plan could be described as an artefact that sets the tone for effective teaching and learning by considering the content to teach and how to teach it with respect to the teacher, the learner, and the environment. This requires a systematic and coherent manner to shape the knowledge, attitude and skills of the learner. The lesson plan could vividly indicate the lesson objective, the activities to support the attainment of the objective, the teaching and learning materials, and the evaluation of the objectives within a stipulated time frame.

Most experts agree that a lesson plan should indicate the instructional objectives, the instructional materials, the procedure, the media, and an assessment technique. Brown (1975) indirectly enumerated the content of a lesson plan as:

a. What kind of things do you want the pupils to learn?
b. What are your precise instructional objectives?
c. What is the most appropriate sequence of the topic and the task?
d. What are the most appropriate methods?

e. How could teach and learning be evaluated?

In the context of Ghanaian education, the Schools Partnership Programme (2016) wrote a book entitled 'Teaching Practice Tutor Handbook' and approved by the Ghana Ministry of Education. The book outlined a lesson plan format for pre-service teachers in Ghana. These include:

a. Day/Duration.
b. Topic/Sub-topic/Aspect.
c. Objectives/Relevant Previous Knowledge (RPK).
d. Teacher/learner activity.
e. Core Points.
f. Evaluation/Remarks

The colleges of education in Ghana are required to take the pre-service teachers through the objectives for the lesson, the sequence and the phases of the lesson plan format (Schools Partnership Programme (2016).

The author argues that a lesson plan must be goal-oriented and must have specific and measurable instructional objectives. The plan must reflect the appropriate teaching and learning materials that will be employed and must be carefully designed to reflect an activity-based method of instruction that is learner-centred, cooperative, interactive, and enhance communication. Where it requires the use of problem-based learning as the instructional strategy, the class must be configured in small groups.

The Three Domains of Learning

The Cognitive, Affective and Psychomotor are generally categorised as the three domains of learning according to literature. The cognitive domain was pioneered by Benjamin Bloom (1956), popularly referred to as Bloom's taxonomy though he was not the sole author but the first. Literature compiled by Hoque (2016) reveals that the affective domain was championed by Krathwohl (1964) as the first author whereas the psychomotor domain was not fully described until in the 1970s by E.J. Simpson (1972) and R. H. Dave (1975).

Learning skills primarily related to mental processing reflect the cognitive domain of learning which involves processing information, constructing understanding, applying knowledge, problem-solving and conducting research. A number of added features can be very useful to educators as they try to construct prime learning experiences (Krathwohl, 2001) as against the earlier version proposed by Bloom (1956). The cognitive domain is categorised into six sub-domains from simple to complex as follows:

a. Knowledge – The ability to recall specific facts, methods and processes. Learners are expected to be able to label, define and/or identify terms involving lower-order thinking.
b. Comprehension – The ability to understand the meaning of what is known. Learners are able to find solutions to assigned problems. This involves questions that require lower-order thinking and the use of illustrative verbs such as explain, convert or summarise.
c. Application – The ability to apply knowledge in a new situation. Learners are able to explain how the solution to a problem was arrived by the use of such things as rules, methods, concepts, and principles. This also requires somewhat lower-other thinking.
d. Analysis – The ability to differentiate facts and opinions and break down materials into its component parts for ease of understanding. This requires higher-order thinking and the use of illustrative words such as differentiate and illustrate, among others.
e. Synthesis – The ability to integrate different concepts to form a sound pattern where new meaning can be established. Learners combine the part of the process in new situations and it requires higher-order thinking. Illustrative verbs include categorise, combine and organise could be used.
f. Evaluation – The ability to come up with judgements about the importance of concepts. Learners are able to create a variety of ways to solve the problem and select the best method suitable for the problem. It requires the highest- order thinking. The sub-domain requires the use of illustrative verbs such as appraise, contrast, support, among others.

The affective domain, on the other hand, reflects the learner's attitude, emotions and feelings but not only the cognitive (mental) functions. The domain also addresses values, appreciation, enthusiasm and motivation on the part of the learner and the facilitator. The

affective domain is categorised into 5 sub-domains, which are listed from the lowest level to highest level as (a) Receiving, (b) Responding, (c) Valuing, (d) Organisation and (e) Characterisation. These are briefly explained as follows:

a. Receiving - This requires paying attention to details to express the awareness of feelings and emotions. An example is listening attentively and closely to the classroom activities. Illustrative verbs that are used include ask, give, follow, among others.
b. Responding – Requires active participation of a learner in given activities. Learners participating in a group discussion may reflect a PBL classroom to complete an assigned task. Illustrative verbs that are used include answer, assist, comply, and practice among others.
c. Valuing – This is the ability of a learner to realise the worth of something and express it. Proposing a plan (e.g. a PBL lesson plan) to improve skills and a facilitator sharing know-how to achieve a learning outcome are examples. Illustrative verbs include describe, explain, complete, follow, initiate, and read.
d. Organisation – This is the ability to bring together different values, resolve conflicts and create a unique value system. An example is learners spend time in a PBL classroom and share ideas freely with their peers. This helps to identify strengths and weaknesses. The use of illustrating verbs such as: adhere, alter, arrange, combine, compare, among others are used.
e. Characterisation – The learner's ability to internalise value and allow that to impact on behaviour. An example includes practicing cooperation in a small group activity and maintaining good study habits. Some illustrative verbs include act, discriminate, display, modify, practice and qualify.

The Psychomotor domain of learning as described by Simpson (1972) involves objectives that are specific to discrete physical functions, reflex actions and interpretative movements. The psychomotor domain comprises utilising motor skills and coordinating them. The domain has seven sub-domains which are mentioned from the lowest to the highest as follows:

a. Perception – The ability to apply sensory information to obtain a cue that guides motor activity. Example is relating to the sound of the drum to the type of dance move. This involves the use of illustrative verbs such as choose, describe, detect, among others.
b. Set – The readiness to act. This includes mental, physical and emotional set. An example is demonstrating how to state lesson objectives during an instructional period to achieve learning outcomes. Illustrative verbs include: begin, display, explain, and show.
c. Guided Response – The ability to imitate a displayed behaviour or to utilise trial and error. This involves the early stages of learning a complex skill. Example: a pre-service teacher emulates the teaching skills of a facilitator during teaching. Illustrative verbs include: assemble, build, and construct are used.
d. Mechanism – The ability to convert learnt responses into habitual actions with proficiency and confidence. A pre-service teacher is able to teach with a lesson plan after practicing how to prepare a lesson plan and rehearsing with it. Illustrative verbs include sketch, fix, assemble, and dissect.
e. Complex Overt Response – The ability to skilfully perform complex patterns of actions. Example: Teaching contents chronologically without looking at the lesson plan. Verbs such as organise, construct, assemble, etc. are used.
f. Adaptation – The ability to modify movement patterns from well-developed skills to meet special events. An example is modifying a lesson plan for the traditional teaching method to suit a PBL lesson plan. Illustrative verbs include adapt, alter, change, reorganise.
g. Origination – Creating a new movement pattern for a specific situation or a particular problem. An example is designing a typical problem-based learning lesson plan for the teaching of college of education Mathematics. The use of verbs such as create, design, and originate are examples.

The author asserts that a good lesson plan must recognise and integrate the six sub-domains of the cognitive domain of learning. The preparation, organisation, and sequencing of

learning activities could reflect these thinking domains to achieve the expected learning outcomes. Furthermore, instructional objectives could be stated to reflect the affective domains and the psychomotor skills with the use of the appropriate illustrative verbs. This implies that a lesson plan, be it PBL or traditional type must state objectives that are specific, measurable, achievable, realistic, and within a time frame to elicit expected learning outcomes. Literature points to the fact that the traditional teaching method has not been helpful in the teaching of Mathematics in Ghana (Enu, et al., 2015). This has created doubt on the effectiveness of a traditional lesson plan and necessitated the need to investigate into the effectiveness of a PBL lesson plan relative to the traditional lesson plan. This is explored in subsequent sections of the paper.

Objective of the Paper

The paper seeks to assess a proposed PBL lesson plan and how the plan dovetails into the teaching and learning of Mathematics for pre-service teachers at the colleges of education in Ghana.

Methodology

This was an investigation that involved a description and content analysis of a proposed PBL lesson plan. A review of the teacher education manual prescribed by the Schools Partnership Programme (2016) and sanctioned by the Ghana Ministry of Education for pre-service teachers was done alongside a proposed PBL lesson plan. This was done to ascertain how each lesson plans justified learner-centredness, cooperation, interactivity, communication, and small group activities as tenets of a PBL lesson for effective Mathematics teaching and learning as proposed by Boye (2019). The two lesson plans were compared and the contents were analysed qualitatively prior to its implementation on the targeted pre-service teachers.

Result and Discussion

This involves critically describing and analysing the contents of the proposed PBL lesson plan as against the lesson plan for the traditional methods of teaching mathematics for pre-service teachers. This is aimed at differentiating between the two with the view to bringing out the supposed advantages the proposed PBL lesson plan has over the current traditional lesson plan. The traditional lesson plan used at the colleges of education in Ghana and the proposed PBL lesson plan are as shown in tables 1.1 and 1.2 respectively.

Table 1.1. A typical Lesson Plan for Traditional Teaching Method

Week Ending		Class:	
Subject		Average Age:	
Reference		Number on Roll:	

Day/Duration	
Topic/Sub-topic/Aspect	
Objective/RPK	
Teacher/Learner Activity	
Core point	
Evaluation/Remarks	

Adopted from Schools Partnership Programme (2016).

Table 1.2. Proposed Problem Based Learning Lesson Plan – Stage 1

Subject		Course	
Topic		Duration	
Overview of lesson:			
Specific objectives	By the end of the lesson, the student should be able to:		
Skills	Students will use problem-solving skills, creative skills, critical and observational skills to comprehend, apply, analyse, synthesise and		

	evaluate.
Knowledge	Students will learn: • To distinguish between….
Attitude	• Problem solving, creativity, and critical thinking. • Cooperation, Communicate skills, Learner-centred, Interactivity, Small group activity.
RPK	Students are able to:
Classroom configuration	Small groups (between 4-8 students) in a semi-circle or such that the groups face the marker board.
Resources/TLM	

Stage 2

Phase	Researcher Activity	Student Activity
Introduction (duration)		
Main Activity (duration)	Activity 1. Activity 2 Activity 3. Etc	
Conclusion (Duration)		
Activity sheet		

By comparing the two lesson plans, one could notice that both provide preliminary information (class, subject, number on roll, duration, topic, etc) about the targeted group (pre-service teachers). This is important as it gives direction and informs the content of the lesson plans. The lesson objective, relevant previous knowledge (RPK), teacher and learner activity, and evaluation are headings that are featured in both traditional and PBL lesson plans.

Conversely, the PBL lesson plan has certain features that make the lesson plan artefact distinct and more promising in the attainment of the expected learning outcomes. For instance, the PBL lesson plan provides an overview of the lesson to be taught for a specific instructional period. The PBL lesson plan has other features such as skills, knowledge, attitude, classroom configuration, and teaching and learning materials/resources. Specifically, the teacher and learner activities under the PBL are intended to reflect the tenets of the PBL lesson (small group activity, learner-centredness, cooperation, interactivity, and communication) as proposed by Boye (2019). Undoubtedly, pieces of literature from experts in the field of Mathematics education continue to recommend a pedagogical approach that makes the learner more active than passive and this characterises the PBL process. More importantly, the design of a PBL lesson to encompass the tenets and the subsequent implementation in the teaching of pre-service Mathematics could address the gaps created by the traditional lesson plan. This has called for a PBL lesson plan that puts the pre-service teacher at the centre of the teaching and learning process interspersed with problem-solving activities.

Generally, the lesson objectives, activities, and evaluation components of both lesson plans support the cognitive domain of learning as postulated by Bloom (1956) and highlighted in the literature above. In particular, however, the PBL lesson plan amply covers some aspects of the affective (attitude) and psychomotor domains (skills) pioneered by Krathwohl (1964) and Simpson (1972) respectively. More so, the PBL lesson plan is accompanied by an activity sheet that has homework or tasks that stimulate learners' lower-order and higher-order thinking to reflect the three domains of learning: cognitive, affective and psychomotor skills of the learners. The PBL lesson plan sets the tone for the design and implementation of a more constructive and learner-centred method of teaching college of education Mathematics that will inure to the benefit of pre-service teachers.

Conclusion and Recommendations

The successful outcome of an instructional period requires detailed planning, organisation, and effective delivery of content based on a carefully designed lesson plan. Lesson plan has been discovered and widely accepted in the teaching and learning environment as a mandatory tool for teaching. A lesson plan is viewed as a set of planned activities in the learning process to reach a certain goal (Amin, 2010). The paper discussed two categories of lesson plan: a lesson plan used for traditional teaching method at the colleges of education in Ghana (Schools Partnership Programme (2016)) and a proposed PBL lesson plan for pre-service teachers in Ghana.

The components of a lesson plan as championed by Brown (1975) above could be summarised as topic, objectives, activities, method and evaluation. Similarly, the Schools Partnership Programme (2016) indicated that a lesson plan for pre-service teachers could have features such as duration of the lesson, topic/sub-topic, objective, relevance previous knowledge, and teacher-learner activity. Others are core points and evaluation. These were reflected in both lesson plans except that the *class configuration* was not captured in the Schools Partnership Programme (2016) for the traditional teaching method. The absence of the regrouping of the class into smaller units under the traditional setup impedes the constructiveness of effective teaching as championed by the PBL approach. Furthermore, the PBL lesson plan better reflects the affective and psychomotor domains (i.e. attitude and skills) of learning. Again, the practicality of the teacher-learner activity fits into the realities of pre-service teachers teaching and learning of Mathematics at the colleges of education.

Finally, the proposed PBL lesson plan sought to make the teaching and learning of Mathematics learner-centred, interactive, cooperative, and enhance communication. This could be achieved in small group activities that are learner dominated. This is expected to make the teaching of Mathematics interesting and promising as the approach could bring out the creative skills and problem-solving abilities in the pre-service teacher that will eventually make them good teachers in the future.

The following are recommended as part of measures to improve upon the teaching and learning of Mathematics by pre-service teachers using PBL lesson plan:

a. The Government of Ghana and stakeholders involved in the teacher education reforms should adopt PBL strategy in the teaching and learning of Mathematics.
b. The National Council for Tertiary Education (NCTE) in conjunction with the various universities in-charge of the colleges of education in Ghana should advocate for the use of PBL approach in teaching.
c. The Ministry of Education should identify and assemble PBL resource persons to design and implement a PBL refresher course for tutors at the colleges of education.
d. The Ghana Education Service should organise PBL workshops and seminars for in-service teachers as part of their professional development strategies.

References

[1] Aggarwal, J. C., (2002). *Principles*, *Methods* & *Techniques of Teaching* (2nd ed). New Delhi: Vikas Publishing House Pvt. Ltd.

[2] Amin, M (2010). Serba-Serbi Pengajaran Bahasa Buku 2, (Surabaya: Edufutura Press), 78- 81

[3] Ampiah, J., Akyeampong, A. K., and Leliveld, M. (2004). Science, mathematics and ICT (SMICT), secondary education in sub-Saharan Africa - country profile Ghana. Centre for International Cooperation (CIS), Vrije Universiteit Amsterdam.

[4] Anderson L.W (1989): The Effective Teacher: McGraw Hill Book Company: Singapore.

[5] Bloom, B.S. (Ed.). Engelhart, M.D., Furst, E.J., Hill, W.H., Krathwohl, D.R. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York: David McKay Co Inc.

[6] Boye, E.S. (2019). Problem based learning in the teaching and learning of Mathematics in Ghana: A literature review. *Texila International Journal of Academic Research*. **ISSN:** 2520-3088 DOI: 10.21522/TIJAR.2014.SE.19.02.Art008

[7] Brown, G (1975). *Micro Teaching,* London: Methuen and Co. Ltd.

[8] Conkell, C. & Imwold, C. (1992). Planning practices and attitudes of physical education teachers. *Physical Educator,* 49(2), 1-5.

[9] Dave, R.H. (1975). *Developing and writing behavioral objective* (R J Armstrong, ed.) Educational Innovators Press.
[10] Enu, J, Agyman, O. K., and Nkum D. (2015). Factors influencing students' mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development, 3(3), 68-74.*
[11] Hanley, S. (1994). On Constructivism. Retrieved from http://www.inform.umd.edu/UMS%2BState/UMDProjects/MCTP/Essays/Constructivism.txt.
[12] Hoque, M.E, (2016). Three Domains of Learning: Cognitive, Affective and Psychomotor. The journal of EFL Education and Research, Vol.2: ISSN-2520-5897.
[13] Krathwohl, D.R., Bloom, B.S., and Masia, B.B. (1964). Taxonomy of educational objectives: The classification of educational goals. Handbook II: Affective domain. New York: David McKay Co.
[14] Lederman, N.G. and Niess, M.L. (2000). If you fail to plan, are you planning to fail? School Science and Mathematics, 100(2), 57-61.
[15] MacDonald, J .and Phillips, R.A.D. (2005). Developing teaching briefs and plan teaching sessions. Education for Primary Care, 16, 496-498.
[16] Ministry of Education (2019). Presentation on the New Curriculum Reform for Basic Schools, Accra, Ghana: Ministry of Education.
[17] Sawada, D., Piburn, M. D., Judson, E., Turley, J., Falconer, K., Benford, R., and Bloom, I. (2002). Measuring reform practices in science and mathematics classrooms: The reformed teaching observation protocol. School Science and Mathematics, 102(6): 245-253. https://doi.org/10.1111/j.1949-8594.2002.tb17883.x.
[18] Simpson E.J. (1972). The Classification of Educational Objectives in the Psychomotor Domain. Washington, DC: Gryphon House.
[19] Schmidt, H. G., Loyens, S. M. M., Van Gog, T., and Paas, F. (2007). Problem-based learning is compatible with human cognitive architecture: Commentary on Kirschner, Sweller, and Clark (2006). Educational Psychologist, 42, 91–97.
[20] Schools Partnership Programme (2016). Teaching Practice Tutor Handbook: Ghana Ministry of Education under Creative Commons Attribution-Share Alike 4.0 International.
http://www.t-tel.org.Version 1.0 January 2016.
[21] Scrivener, J (2005). Learning teaching (2nd ed), Oxford: Macmillan.
[22] Shen, J, Poppink, S, Cui, Y. and Fan, G. (2007). Lesson planning: A practice of professional responsibility and development. Educational Horizons, 85(4), 248-258.
[23] Woodward T (2009): Planning Lesson and Course: Cambridge University Press, Cambridge.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art007

Mobile Learning Support in Delivering Distance Education: Perception of Students of University of Cape Coast, Ghana

Douglas Yeboah[1]*, Paul Nyagorme[2], Kwaku Barfi[3]
[1]*Cape Coast Study Centre, Institute for Distance and e-Learning, University of Education, Winneba, Ghana*
[2]*College of Distance Education, University of Cape Coast, Cape Coast, Ghana*
[3]*Sam Jonah Library, University of Cape Coast, Cape Coast, Ghana*
**Corresponding Author: douglas.yeboah@stu.ucc.edu.gh*

Abstract

This paper explored the perception of University of Cape Coast distance education students on the use of mobile technologies to facilitate interactions among students and tutors as a learning-support system. The paper aimed at establishing whether distance education students would accept to be taught using a blend of mobile technologies and biweekly direct face-to-face tutorials on weekends. A questionnaire was used to collect data from a sample of 300 students pursuing various Diploma, Bachelor's and Master's degrees by distance at University of Cape Coast using systematic sampling technique. The data was analysed using descriptive statistics. It was found that scheduled face-to-face tutorial sessions of distance education in University of Cape Coast were not supportive enough to address students' learning needs. Also, all the respondents possessed mobile devices and perceived blending of mobile learning in distance education as an avenue to enhance collaborative learning with faculty and colleagues. It was recommended that curriculum and instructional designers of distance education courses must consider incorporating mobile learning pedagogies in the distance courses and learning experiences to address students' learning needs using mobile technologies.

Keywords: *blended learning, distance education, learning technologies, m-learning, online teaching, transactional distance.*

Introduction

The expeditious development of information and communication technology (ICT) has contributed to the introduction of new ways of delivering lessons to students. Distance education is one of such new approaches. Based on this assertion, the ways of lesson delivery and acquisition of knowledge are not restricted by space and location any more. According to Bušelić (2012), there are technologies that can offer flexibility in when, how and where students can acquire knowledge. Students worldwide enroll in distance education programmes as a way of increasing access to formal education to otherwise disadvantaged individuals (Collins, McKinnies & Collins, 2010).

Distance education has been conceptualized by various authors. In the view of Larson and Owusu-Acheaw (2016), distance education is a form of education where learners have minimal physical contact with their tutors. In a similar vein, Mabawonku (2004), described distance education as a form of education in which there is geographical separation between the learner and the learning institution. Such separation between distance learners and their lecturers is often a barrier to interaction among the students, their peers and lecturers which is otherwise necessary to support students' effective learning.

Learning is most successful for students when they are able to interact with each other through interrogating and sharing of ideas (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher, 2019). However, learning tends to be problematic when interaction between lecturers and students are irregular. The incorporation of mobile technologies, such as smart phones and tablet computers in distance education can address this gap. Blending distance education with social interactions using mobile technologies can enhance easy communication between distant learners and lecturers, as well as

between students and peers. According to Makoe (2013), the introduction of mobile technologies in blended learning holds considerable promise for distance education as a cognitive delivery tool to enhance collaborative learning.

Blended learning refers to a learning process that involves use of a combination of technology and direct face-to-face contacts (Singh, 2012). In the view of Kintu, Zhu and Kagambe (2017), adopting blended learning balances success between distance education using technology and traditional face-to-face learning approaches. Examples of blended learning include a combination of e-learning modules and time-tabled online tutorials using chat room facilities that are integrated into a learning management system (LMS).

In Ghana, the situation of inadequate interaction among distance education students and their tutors are not different. Some Universities in Ghana scheduled face-to-face weakened meetings between their distance students and tutors to deliver lessons.

Statement of the Problem

Tertiary institutions are embracing a number of innovations in pedagogies and some of these involve the use of technology in blended learning. The pedagogy of blended learning (combination of face-to-face and online teaching/learning) initiatives is part of these innovations. However, the efficiency of some of these innovations, especially among University of Cape Coast distance education students faces challenges.

From informal interactions the researchers had with some distance education students of the University of Cape Coast, it was revealed that some of the students have difficulty understanding the course content discussed at face-to-face biweekly tutorials sessions. Some of the distance education students complained that they were not afforded sufficient opportunities to clarify their misunderstandings at tutorial sessions because so much contents were hastily discussed by tutors in a limited time.

There is numerous literature that support the use of mobile devices to facilitate communication among students and tutors or lecturers to support collaborative learning in distance education environments (Yousuf, 2006; Kukulska–Hulme & Traxler, 2005). The use of mobile devices is suitable especially in learning environments where time is a limited asset. However, there is literature gap on how distance education students in Ghana perceive the usefulness of mobile learning as a supportive pedagogy to enhance their interaction with peers and course tutors to facilitate their learning. This study sought to address this gap.

Purpose of the Study

The purpose of this study was to find out whether distance education students in Ghana accept the blend of weekend face-to-face tutorials at two weeks intervals with mobile learning support system outside the tutorial sessions.

Research Objectives

The objectives of the study were to:

1. determine the extent to which distance education students desire for additional learning support systems besides their scheduled biweekly face-to-face tutorial sessions.
2. find out the proportion of distance education students who owned mobile devices.
3. determine the extent of distance education students' willingness to use mobile devices as a complement to face-to-face learning activities.
4. determine how distance education students perceive the effectiveness of blending mobile learning pedagogy with face-to-face tutorial sessions.

Research Questions

1 To what extent do distance education students desire for additional learning support systems besides their scheduled biweekly face-to-face tutorial sessions?

2 What proportion of distance education students own mobile devices?

3 To what extent are distance education students willing to use mobile devices as a complement to face-to-face learning activities?

4 How do distance education students perceive the effectiveness of blending mobile learning pedagogy with face-to-face tutorial sessions?

Meaning of Mobile Learning

There have been a number of definitions of the concept of mobile learning by different authors. Among these, Quin (2001), Brown (2005) and Crescente and Lee (2011) are of the view that mobile learning is a subset or extension of e-learning through mobile computational devices. Others also perceive mobile-learning as the processes of acquiring knowledge "through conversations across multiple contexts among people and personal interactive technologies" (Sharples, Taylor & Vavoula, 2007:224). El-Hussein (2010) defined mobile learning as "any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, mobility of the learner and mobility of learning" (p. 20). Keegan (2005) defines mobile learning as learning accomplished with the use of small, portable computing devices such as smartphones, personal digital assistants (PDAs) and similar handheld devices.

One of the paramount features of mobile learning emphasized in all definitions is that it involves the use of devices that are portable and convenient for learners to carry with them anywhere, anytime and enable learners to access sources of learning materials or information at any time anywhere as opposed to devices that are required to be fixed at a place like the desktop computer. Recent innovations in software applications and social media software using Web 2.0 technologies (e.g., blogs, wikis, Twitter, YouTube, WhatsApp) or social networking sites (such as Facebook and Myspace) have made mobile devices continuously changing and spreading. Also, mobile devices give assurance of more potential usage in education.

Blending Mobile Learning in Distance Education

The rate of penetration and ubiquitous nature of mobile devices present tremendous opportunities to educators, particularly those involved in distance education, to utilize these devices to provide support for enhancement of teaching and learning. Besides high rate of penetration, mobile devices present other advantages which make them suitable for use in supporting learning in distance education (Becking et al, 2008). These advantages include the use for independent and collaborative learning experiences and affordability. Due to these and more advantages of mobile devices, they are thus used in distance education to address variety of student needs.

One of the challenges encountered by distance education students is a sense of isolation which comes as a result of the geographic distance separating students from their peers, and between students and their tutors (Galusha, 1997; Gibson & Graff, 1992). In addressing this challenge for distance learners, mobile devices are used to increase interaction among students and between students and faculty. Mobile devices are also used to support collaborative learning (Yousuf, 2006; Kukulska–Hulme & Traxler, 2005). Furthermore, mobile devices are used by faculty to provide immediate feedback to distance learners as part of improvement in their interactivity.

As reported by Foti and Mendez (2014), mobile learning affords both students and faculty the additional opportunity to conveniently access information instantaneously regardless of their location. By so doing, learning thus occurs anywhere at any time through the use of mobile devices.

The preceding discussion of literature establishes the foundation for variety of reasons and applications of mobile technologies in distance education to facilitate students' learning. However, there is not much empirical evidence supporting the awareness of distance education students in Ghana regarding the benefits of blending mobile learning pedagogy in the teaching and learning processes of distance education.

Theoretical Framework

The study was underpinned by transactional distance theory which defines critical concepts of distance learning. Moore (1997) viewed transactional distance as a distance which is considered as not being a geographic separation but as a pedagogical concept. The theory allows for a programme in which the principal form of communication is through technology and where technology-mediated communication is ancillary to the classroom (Moore, 2007). According to Tatar, Roschelle, Vabey and Pennuel (2003) the latter programme is important for mobile learning because mobile devices are used in the school settings as an ancillary element but

mostly extend beyond the classroom to non-traditional, informal and non-institutional settings. This view is supported by Park (2011) who revealed that the nature of transactional theory and its applicability makes it useful for mobile learning.

Educational applications of mobile learning can be classified based on the transactional distance theory. Park (2011) modified the transactional distance theory and used it to classify mobile learning into four categories viz. high transactional distance socialized m-learning, high transactional distance individualized m-learning, low transactional distance socialized m-learning and low transactional distance individualized m-learning.

In high transactional distance socialized mobile learning activity, learners are said to have more psychological and communication space with their teacher (Park, 2011). The learners engage in group learning where they communicate and collaborate with one another. Also, the learning resources are provided from a predetermined programme through mobile devices. Communication mainly occur among learners, and the teacher has little involvement in facilitating the group activity.

In high transactional distance and Individualized mobile learning activity, the individual learners have more psychological and communication space with the instructor or instructional support (Park, 2011). According to her, the individual learners receive well organized content and resources through mobile devices. The individual learners receive the content and control their learning process in order to master it and the interactions are usually carried out between the individual learner and the content. This type of mobile device application learning demonstrates an expansion of the scope of e-learning which allows greater flexibility and portability.

A third type of mobile technology application in learning is the low transactional distance and socialized mobile learning activity in which individual learners communicate with the teacher and fellow learners through mobile devices (Park, 2011). According to Park (2011), the learners have less psychological and communication space with the instructor and the instruction is loosely structured. This type is said to demonstrate the most advanced form in terms of the variety of mobile devices and learners' social interactions.

This last type which is the low transactional distance and individualized mobile learning activity refers to less psychological and communication space between instructor and learner. On this basis, individual learners can interact directly with the instructor and the instructor leads and controls the learning in an effort to meet learners' needs while maintaining their independence (Park, 2011). This type has the features of mobile learning that supports blended mode.

Materials and Methods

Research Design

The research methodology employed in this study was descriptive quantitative methodology. The descriptive methodology has varied approaches such as observation studies, correlational research and survey research.

Among the various approaches to descriptive methodology, survey research design was used in this study because it was found to be most suitable. Survey research, as described by Leedy and Ormrod (2010, p.187), involves obtaining information about the characteristics, opinions, attitudes or previous experiences of one or more groups of people, perhaps by asking them questions and tabulating their answers. The ultimate goal of survey research design is to generalize findings to a larger population.

The choice of survey design for this study was due to its merit of gathering various responses from a wide range of people. Furthermore, descriptive survey helps to present the true state of affairs of a given situation after data have been collected from a number of people who respond to the same set of questions about a given situation (Gay, 1992). This approach is more suitable for this research because it was intended to acquire information about the attitude of distance learners concerning the possibility of blending mobile learning pedagogy in instructional activities.

Sampling Procedure

Systematic sampling technique was used to select the participants of the study. The sample included students pursuing various programmes at Master's degree, Bachelor's degree and

Diploma levels. They comprised three hundred students studying at the Cape Coast study center of the College of Distance Education, University of Cape Coast. The use of random sampling was informed by its merit of enhancing representativeness of the population by the sample. The breakdown of the constituent of the sample according to academic levels were presented in Table 1.

Table 1. Breakdown of respondents included in the study

	Diploma	**Bachelor's degree**	**Master's degree**	**Total**
Population	1340	730	215	2285
Sample	134	134	32	300

Source: of population figures: UCC-SRIMS, Record Guide (2019).

As indicated in Table 1, the sample of the study consisted of 134 students pursuing various programmes at each of Diploma and Bachelor's degree levels and 215 students at the Master's degree level. Thus, a total of 300 sample size was obtained for the study.

Data Collection and Analysis

A questionnaire was used as an instrument to collect data for the study. Questionnaire is a useful and widely used instrument for collecting survey information, providing structured and often numerical data in various scales of measurement such as nominal and ordinal. Also, it is useful for the collection of data without the presence of the researcher, and it is often comparatively straight forward to analyse (Cohen, Manion & Marrison, 2005). Questionnaire is a very effective instrument for acquiring factual information about practices and conditions of which the respondents are presumed to have knowledge. It is also suitable for enquiring into the opinions and attitudes of respondents. Furthermore, questionnaire was deemed appropriate for this study because the respondents were all literate in English language.

The questionnaire items were adapted from related studies conducted in other parts of the world (Vyas & Nirban, 2014; Alsaadati, 2017). Relevant information from the literature reviewed aided in the design of the questionnaire which consisted of three sections. The first section of the questionnaire centered on the demographic information about the respondents while the second section focused on finding out about whether students owned mobile devices and which mobile devices were owned by the students. The third and final part focused on finding out whether students perceived that their learning needs were satisfied through the scheduled biweekly weekend face-to-face tutorial sessions alone, or they needed additional learning support from their peers and lecturers. Also, the final part of the questionnaire enquired whether students would embrace academic support from peers and lecturers offered through mobile devices besides the scheduled face-to-face tutorial sessions.

The Scale

The content and face validity of the questionnaire were established with the help of two lecturers in Educational Technology. Also, the reliability of the instrument was tested using Statistical Package for Social Sciences (SPSS) after a pilot test. The reliability test produced Cronbach's Alpha of 0.742 on 20 responses of 8 items. The Cronbach's Alpha obtained was greater than the recommended acceptable minimum value of 0.70, therefore the instrument was found to be reliable enough to be used for the main study.

Data Collection Procedures

The researchers visited various lecture rooms in turns and sought permission from the course tutors. They explained the purpose of the study to the various classes and sought the consent of students who wished to voluntarily participate in the study. In each class, after some students volunteered to participate in the study, a systematic random sampling technique was used to select a sample. Subsequently, copies of the questionnaire were given to the sample for completion. For each class the researchers visited, the participants completed the questionnaires and returned same to the former on the same day.

Data Processing and Analysis

The data obtained from the completed questionnaires were screened, coded and analyzed using descriptive statistics. Frequencies and percentages were generated for responses to the various questionnaire items using IBM Statistical Package for the Social Sciences (IBM SPSS) version 25. The descriptive statistics so generated were further presented in frequency tables.

Results

The study targeted all students pursuing various undergraduate and graduate programmes by distance at the Cape Coast study center of the College of Distance Education (CoDE) of the University of Cape Coast, in Ghana. However, a sample was drawn to participate in the study. The data obtained on sex characteristics of the participants were presented in Table 2.

Table 2. Distribution of participants by sex

Sex	No. of Students	Percentage (%)
Male	160	53.3
Female	140	46.7
Total	**300**	**100.0**

As shown in Table 2, the participants consisted of 300 distance education students. These comprised 160 males representing 53% and 140 females (48%). This shows the number of male students who participated in the study slightly outnumbered the female counterparts.

The study also obtained data on the academic levels at which the participants pursued various programmes. This data was presented in Table 3.

Table 3. Distribution of Respondents by Programme Level

Programme Level	No. of Students	Percentage (%)
Diploma	134	44.7
Bachelor's Degree	134	44.7
Master's Degree	32	10.6
Total	**300**	**100.0**

The data presented in Table 3 indicates that the participants were pursuing various programmes at the Diploma, Bachelor's and Master's degree levels. At each of diploma and bachelor's degree levels, 134 students representing about 45% participated in the study. The least number of participants being 32 (approximately 11%) were pursuing programmes at the Master's degree level.

Research Question 1: To what extent do distance education students desire for additional learning support systems besides their scheduled biweekly face-to-face tutorial sessions?

The study sought for information from the participants as to whether they perceived biweekly weekend face-to-face tutorial sessions to be sufficiently supportive to their learning or they desired for additional learning support systems. Item 7 on the questionnaire made a positive declaration that: "Face-to-face tutorial sessions held every other weekend are sufficient for distance learners to effectively learn all they need to learn.". The participants indicated their perception by selecting one of five-point Likert scale responses ranging from strongly disagree to strongly agree. Their responses were presented in Table 4.

Table 4. Students' contentment with biweekly weekend face-to-face tutorial sessions

Responses	No. of Students	Percentage (%)
Strongly Agree	2	0.7
Agree	8	2.7
Neutral	35	11.7
Disagree	157	52.3
Strongly Disagree	98	32.7
Total	**300**	**100.0**

The data in Table 4 showed that 255 participants representing 85% disagreed with the statement that biweekly face-to-face tutorial sessions were sufficiently supportive for their learning. This was an indication that the greatest majority of the participants felt that their learning needs were not satisfied by the biweekly face-to-face tutorial sessions alone.

As a follow-up to the data obtained in Table 4, item 11 of the questionnaire made a negative statement that "Face-to-face tutorial sessions held every other weekend alone are **Not** sufficient for distance students to effectively learn all they need to learn". This statement was meant to solicit perceptions of the participants regarding whether and the extent to which they felt face-to-face tutorial sessions alone did not meet their learning needs and therefore they desired for extra learning support systems. Their responses were presented in Table 5.

Table 5. Distance education students' perception that biweekly face-to-face tutorial sessions alone do not meet their learning needs

Responses	**No. of Students**	**Percentage (%)**
Strongly Agree	105	35
Agree	177	59
Neutral	0	0
Disagree	18	6
Strongly Disagree	0	0
Total	**300**	**100**

The data presented in Table 5 indicated that 282 participants representing 94% agreed that biweekly face-to-face tutorial sessions held on weekends alone did not meet their learning needs. It was evident that majority of the participants had perception that biweekly face-to-face tutorial sessions alone were not sufficient to meet their learning needs. This confirmed the findings from Table 4. Supplementary learning support systems would therefore be desirable.

Research question 2: What proportion of distance education students own mobile devices?

The study solicited responses from the participants to the question: "Do you have a mobile communication device?". The purpose of this question was to ascertain the proportion of students who had mobile communication devices that could be used in mobile learning pedagogy. Responses from the participants to this question were summarized in Table 6.

Table 6. Proportion of distance students who owned mobile devices

Responses	**No. of Students**	**Percentage (%)**
Yes	300	100
No	0	0
Total	**300**	**100**

The data presented in Table 6 showed that all the participants (100%) owned mobile communication devices.

In an attempt to find out the specific mobile communication devices the participants owned, a follow-up question was posed: "If yes, which mobile communication devices do you have?". Alternative choices provided by the questionnaire were smart phone, tablet, laptop and 'other' (to be specified by respondents). The responses obtained were summarized in Table 7.

Table 7. Mobile devices possessed by distance students

Responses	**No. of Students**	**Percentage (%)**
Smart phone	135	45.0
Smart phone and Laptop	119	39.7
Smart phone and Tablet	11	3.7
Tablet and Laptop	35	11.7
Total	**300**	**100.0**

The data presented in the Table 7 revealed that 135 participants representing 45% owned smart phones alone, 119 (40%) owned both smart phones and laptop computers, 11 (4%) owned smart phones and tablets, and 35 (12%) owned both tablets and laptop computers. It was evident from the data that 265 participants representing 88% owned either a smart phone alone or a smart phone and another mobile device. Also, all the participants possessed some kind of mobile communication devices.

Research question 3: To what extent are distance education students willing to use mobile devices as a complement to face-to-face learning activities?

The participants were further probed to affirm whether they would be willing to participate in mobile learning activities with their course mates and tutors/lecturers besides their biweekly face-to-face tutorial sessions. This was accomplished through item 10 of the questionnaire which stated that "If formal arrangements are made by the university for lecturers/tutors and students to use mobile applications such as WhatsApp messenger to discuss academic work anytime, anywhere; I will seriously participate". The respondents indicated their level of willingness to participate in mobile learning activities by choosing an option in the continuum from strongly disagree to strongly agree on a five-point Likert scale. The responses obtained were presented in Table 8.

Table 8. Students' willingness to participate in mobile learning activities besides face-to-face tutorial sessions

Responses	**No. of Students**	**Percentage (%)**
Strongly Agree	146	48.7
Agree	154	51.3
Neutral	0	0
Disagree	0	0
Strongly Disagree	0	0
Total	**300**	**100**

The summary of responses presented in Table 8 indicated that all the 300 respondents representing 100% agreed that they would willingly participate in mobile learning activities to complement the scheduled biweekly face-to-face tutorial sessions.

Research question 4: How do distance education students perceive the effectiveness of blending mobile learning pedagogy with face-to-face tutorial sessions?

The study solicited information on how the participants perceived the effectiveness of blending mobile learning pedagogy with biweekly face-to-face tutorial sessions. This was accomplished by asking the subjects to make a comparison of two modes of distance education delivery and select one they perceived would help students learn better. The first mode involved only biweekly face-to-face tutorial sessions while the other mode involved a blend of the earlier mode with mobile learning activities that would be available to learners anytime in their convenience. Responses of the participants were summarized in Table 9.

Table 9. Students' comparison of distance education delivery modes

Responses	**No. of Students**	**Percentage (%)**
Only face-to-face tutorials	5	2.0
Blended face-to-face tutorials and mobile learning	295	98.0
Total	**300**	**100.0**

The data in Table 9 showed that 295 participants (98%) were in favour of blended face-to-face tutorial sessions with mobile learning support in distance education delivery. This data gave indication that the participants perceived distance education delivery mode that involve a blend of mobile learning pedagogy with face-to-face tutorial sessions as being more effective in supporting students' learning than only biweekly face-to-face tutorial sessions.

Discussion

The analysis of the data revealed that a great majority of the participants being 85% disagreed with the statement that biweekly face-to-face tutorial sessions were sufficiently supportive for

their learning. Also, 94% of the participants agreed that biweekly face-to-face tutorial sessions held on weekends alone did not meet their learning needs. These two findings from the study revealed that distance education students of the University of Cape Coast deeply desired for additional learning support systems that would adequately address their learning needs. Consistent with the findings of this study, Hagel and Shaw (2006) also found in a study in which students compared face-to-face study mode to web-based mode that the students perceived the latter study mode to be more functional than the former.

It was also found that all the participants being 100% possessed smart phones. In addition to the smart phones, some owned tablet computers and or laptop computers. This finding is consistent with Huang (2016) and Hussin, Manap, Amir and Krish (2012). Huan observed that among Chinese undergraduate students, mobile phones were a major mobile technology that they possessed and 100% of the Chinese students who participated in his study owned mobile phones before starting college. Similarly, Hussin *et al.* found that all the students sampled in two Malaysian universities owned mobile phones. This makes mobile phones a feasible technology for pedagogical use in university education.

All the participants (100%) affirmed that they were willing to participate in mobile learning activities if implemented by the university for them to interact with fellow students and tutors/lecturers in connection with academic work anytime, anywhere, besides their scheduled biweekly weekend face-to-face tutorial sessions. This finding is consistent with Economides and Grousopoulou (2010) who observed that university students were most likely to use their mobile devices for obtaining information about lessons and exams, and arranging meetings with classmates. Also, the finding underscores that distance education in Ghana is characterized by high transactional distance and individualized learning (Park, 2011) which students perceive does not sufficiently meet their learning needs. As a result, the students desired for low transactional distance and socialized mobile learning activities in which individual learners communicate with the teachers and fellow learners through mobile devices.

Finally, 98% of the participants expressed their perception that distance education delivery involving a blend of fortnight face-to-face tutorial sessions with mobile learning activities that are always accessible to students would be more effective than only weekend face-to-face tutorial sessions held fortnightly. This finding is also consistent with Huang (2016). Huang found that Chinese undergraduate students were optimistic about the potential benefits of mobile phone integrated learning and that students were more likely to initiate mobile learning activities than their faculty.

Conclusion

It could be concluded that distance education students of the University of Cape Coast need additional learning support that would always be available from their course mates and faculty members by which their learning needs could be addressed anytime, and anywhere. This need could be met by incorporating mobile learning in distance education to close the transactional distance among learners and their lecturers. Also, because all the students possessed at least one mobile device and expressed willingness to participate in mobile learning activities, if mobile learning is incorporated into distance education in Ghana, it will possibly have massive acceptance by all the students.

References

[1] Amedahe, F. K. (2002). *Fundamentals of educational research methods*. Mimeograph, UCC, Cape Coast, Ghana.

[2] Becking, D. (2008). How to match mobile learning resources with learners' current needs: the didactic profiling, [online] Available at http://pi1.fernunihagen.de/publikationen/pub2005.html.

[3] Brown, T. H. (2005). Towards a model for m-learning in Africa. International Journal of ELearning, vol. 4, no. 3, pp. 299-315, AACE, Norfolk, USA.

[4] Bušelić, M. (2012). Distance learning–concepts and contributions. Oeconomica Jadertina, 23-31.

[5] Cohen, L., Manion, L., & Marrison, K. (2005). Research method in education (5th ed.). New York.

[6] Collins, S., McKinnies, R. C., & Collins, S. K. (2010). Distance learning and how access to Education Can Be Improved. Online Journal of Workforce Education and Development, vol. 4, no. 2, 1-12.

[7] Crescente, M. L., & Lee, D. (2011). Critical issues of m learning: design models, adoption processes, and future trends. Journal of the Chinese institute of industrial engineers, vol. 28, no. 2, pp. 111-123. DOI: 10.1080/10170669.2010.548856.
[8] Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2019). Implications for educational practice of the science of learning and development. Applied Developmental Science, 23.
[9] Economides, A. A. & Grousopoulou, A. (2010). Mobiles in education: students' usage, preferences and desires. Int. J. Mobile Learning and Organisation, 4(3), 235-252.
[10] El-Hussain, M. O., & Cronje, J. C. (2010). Defining mobile learning in higher education landscape. *Educational Technology and Society*, vol. 13, no. 3, pp. 12-21.
[11] Foti, M. K., & Mendez, J. (2014). Mobile learning: how students use mobile devices to support learning. Journal of literacy and technology, vol. 15, no. 3. Available at http://www.literacyandtechnology.org/uploads/1/3/6/8/136889/jlt_v15_foti.pdf.
[12] Galusha, J. M. (1997). Barriers to learning in distance education. Interpersonal Computing and Technology, vol. 5, no. 3, pp. 6-14. [online] Available at http://files.eric.ed.gov/fulltext/ED416377.pdf.
[13] Garrison R. (2000). Theoretical challenges for distance education in the 21st century: A shift from structural to transactional issues. International Review of Research in Open and Distance Learning, vol. 7, no. 1. DOI: https://doi.org/10.19173/irrodl.v1i1.2.
[14] Gay, L. R. (1992). Educational research: competencies for analysis and application. (4th ed.) New York: Merrill/Macmillan.
[15] Gibson, C. C., & Graff, A. O. (1992). Impact of adults' preferred learning styles and perception of barriers on completion of external baccalaureate degree programmes. International Journal of E-Learning & Distance Education, vol. 7, no. 1, pp. 39-51. [online] Available at http://www.ijede.ca/index.php/jde/article/view/413/303.
[16] Hagel, P. & Shaw, R. N. (2006). Students' perceptions of study modes. Distance Education, 27(3). 283-302.
[17] Huang, G. (2016). Using mobile phones for teaching and learning in Chinese traditional undergraduate education (Doctoral dissertation). Nova Southeastern University. [online] Available at NSU Works, College of Engineering and Computing. (983) https://nsuworks.nova.edu/gscis_etd/983.
[18] Hussin, S., Manap, M. R., Amir, Z. and Krish, P. (2012). Mobile learning readiness among Malaysian students at higher learning institues. Asian Social Science, 8(12), 276-283. Available at http://dx.doi.org/10.5539/ass.v8n12p276.
[19] Keegan, D. (2005). The incorporation of mobile learning into mainstream education and training. mLearn2005: 4th World conference on m-Learning. Cape Town: mLearn2005.
[20] Kintu, M. J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: the relationship between student characteristics, design features and outcomes. International Journal of Educational Technology in Higher Education, vol. 14, No. 7.
[21] Kukulska–Hulme, A., & Traxler, J. (2005). Mobile learning: A handbook for educators and trainers. London: Routledge.
[22] Larson, A. G., & Owusu-Acheaw, M. (2016). Information needs of distance learners: A case of Winneba study center, University of Education, Winneba, Ghana. Turkish Online Journal of Distance Education, vol. 17, no. 3, 62-67.
[23] Mabawonku, I. (2004). Library use in distance learning: a survey of undergraduates in three Nigerian universities. African Journal of Library, Archives and Information Science, vol. 14, no. 1, 151-166.
[24] Makoe, M. (2013). The pedagogical suitability of using cell phones to support distance education students. Open Learning, 114-123.
[25] Moore, M. G. (1997). Theroy of transactional distance. In D. Keegan (Ed.), Theoretical principles of distance education (pp. 22-38). NY: Routlege Studies in Distance Education.
[26] Moore, M. G. (2007). The theory of transactional distance. In M. G. Moore (Ed.), Handbook of distance education (pp. 89-105). Mahwah, NJ: Lawrence Erlbaum Associates.
[27] Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. International Review of Research in Open and Distance Learning, vol. 12, no. 2, pp. 78-102. DOI: https://doi.org/10.19173/irrodl.v12i2.791.
[28] Quin, C. (2001). M-Learning: Mobile, wireless, in-your-pocket learning. Line Zine, Fall 2002. [online] Available at http://www.linezine.com/2.1/features/cqmmwiyp.html.
[29] Sharples, M. (2002). Disruptive devices: mobile technology for conversational learning. International

Journal of Continuing Engineering Education and Lifelong Learning, vol. 12, no. 5/6, pp. 504-520. [online] Available at https://www.researchgate.net/profile/Mike_Sharples/publication/245528132_Disruptive_Devices_Mobile_Technology_for_Conversational_learning/links/00b4952cac64c72c7f000000.pdf.

[30] Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age. In Andrews, R. & Haythornthwaite, C. (Eds.), The sage handbook of e-learning research, (pp. 221–247). London: Sage.

[31] Singh, R. J. (2012). Current trends in higher education learning and teaching. South African Journal of Higher Education, 26(1), 5-9.

[32] Tatar, D., Roschelle, J., Vabey, P., & Pennuel, W. R. (2003). Handhelds go to school: Lessons learned. The IEEE Computer Society, vol. 36, pp. 30-37. DOI: 10.1109/MC.2003.1231192.

[33] Thorpe, M. (2002) Rethinking learner support: the challenge of collaborative online learning, Open Learning: The Journal of Open, Distance and e-Learning, vol. 17, no. 2, pp. 105-119, DOI: 10.1080/02680510220146887a.

[34] Vyas, N., & Nirban, V. S. (2014). Students' perception on the effectiveness of mobile learning in an institutional context. ELT Research Journal, vol. 3, no. 1, 26- 36. [online] Available at http://dergipark.org.tr/eltrj/issue/5481/74444.

[35] Yousuf, M. (2007). Effectiveness of mobile learning in distance education. Turkish Online Journal of Distance Education, vol. 8, no. 4, pp. 114-124. [online] Available at http://dergipark.org.tr/tojde/issue/16922/176609.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art008

An Investigation into Engagement Processes between Antenatal Providers and Users in Lundazi District – Zambia

Patricia Mambwe[1]*, Catherine. M. Ngoma[2]
[1]D*epartment of Nursing, School of Health Sciences, Rusangu University, Monze, Zambia*
[2]*Department of Midwifery, School of Nursing, University of Zambia, Lusaka, Zambia*
**Corresponding Author: mambwepatricia105@gmail.com*

Abstract

Background: Strategies to engage pregnant women in their prenatal care, educating them and encourage hospital deliveries are important elements to consider in efforts aimed to improve quality Antenatal Care (ANC).

Methods: A facility based cross-sectional study employing both qualitative and quantitative methods was conducted in Lundazi District, Zambia. Engagement processes between ANC providers and pregnant mothers during the provision of antenatal care were explored. Data was collected from sixty pregnant women who attended ANC clinic in five public health facilities. It was also collected from seventy-five ANC providers. Data were collected through focus group discussion with ANC users, observation during consultation and self-administered questionnaire from ANC providers.

Results: This study observed that one to one individualized health education was not reinforced despite the health and gestational age of clients. Only thirty-seven percent of ANC providers explained their findings to the clients during physical examination. Clients were not counselled on blurred vision, severe headache, convulsions, fever and difficulties in breathing. This study further found that ANC providers could not explain the reason for referral submitting that Antenatal mothers would still not understand even if staff took the entire year explaining. However, eighty percent of the ANC users were encouraged to deliver from the health facility.

Conclusion: Lack of engagement with ANC users indicates missed opportunities for delivering quality ANC Care. Reforcement of this component would improve the quality of care and improve maternal and fetal wellbeing.

Key words: *Antenatal care providers, Antenatal care Users, engagement processes.*

Introduction

Antenatal care (ANC) plays a central role in the continuum of quality care, a critical framework for understanding the continuity between maternal, newborn and child health (Mc Nellan et al., (2019). ANC is an opportunity for skilled professionals to educate and engage with women about signs of danger signs in pregnancy, when to seek health care, nutrition in pregnancy, reasons for referral, procedures in ANC, importance of ANC visits and availability of modern family planning (AbouZahr and Wardlaw, 2004). Patient engagement is emerging as a significant component of efforts to improve health outcomes (Barello et al., 2012; Graffigna et al., 2014). Patient engagement includes involving patients and their families in their care by educating them about the risks and benefits of treatments and empowering them to make informed decisions in partnership with their providers (AbouZahr and Wardlaw, 2004 Barello et al., 2012; Graffigna et al., 2014). The cardinal rationale for engaging patients has its roots in the ethical principles of respecting the patient's autonomy and promoting self-determination (Mohamad et al., 2017). Studies have highlighted that pregnant women want to be involved in their care and more specifically in making decisions about their care (Vlemmix et al., 2013). This study aimed at investigating the engagement processes between antenatal providers and users in Lundazi district – Zambia.

Materials and Methods

A facility based cross- sectional study employing both qualitative and quantitative methods was conducted between October 2019

and June 2020 in Lundazi District, Zambia. Engagement processes and procedures between ANC providers and pregnant mothers during the provision of antenatal care were explored. Six (6) study sites were purposively selected (These were health facilities which had recorded high numbers of referred clients, who ended up dying during pregnancy, labour or delivery or who recorded a maternal death in the year "2019").

75 individual study subjects who happen to be ANC providers at each health facility were selected using purposive sampling method (A provider who has been working in Antenatal clinic and gained experience for not less than six (6) months).

For Antenatal care observations made during ANC consultations, simple random sampling method was used to draw the sample of 60 ANC Users. Furthermore, 60 ANC users were selected using purposive sampling method to participate in the focus group discussion.

A self-administered questionnaire was used to collect data from the ANC providers, Maternal and new born Quality of Care Survey Antenatal Care Observation Checklist was used to collect data during the provision of ANC care and a focus group discussion guide.

Quantitative data was entered and analyzed with use of the statistical package for social sciences program software (SSPS Version 23). For qualitative data, identified themes and subthemes were reviewed by the Researcher and similar themes were grouped together. Qualitative data was then triangulated with quantitative data to give an in-depth understanding of the quality of antenatal care provided to pregnant women.

Results

This study found that one to one individualized health education was not reinforced despite the health and gestational age of clients. Only thirty-seven percent of ANC providers explained their findings to the clients during physical examination. Clients were not counselled on blurred vision, severe headache, convulsions, fever and difficulties in breathing. This study further found that ANC providers could not explain the reason for referral submitting that Antenatal mothers would still not understand even if staff took the entire year explaining.

Focus group participants shared their views concerning referrals to the hospital. Participant 3 from facility 'B' said,

If ANC providers find a problem when palpating our abdomen, they tell us to go to the hospital (Lundazi District Hospital). They don't tell t us why we are being referred. (Participant 3, 23years old).

Another participant from the same facility added saying,

Health workers tell us that even if they took a full year explaining the reason for referral, we would still not understand. They tell us to just go.

This study further found that clients were given the same day for review regardless of their gestational age. The study identified serious gaps from the physical environment where antenatal mothers were screened and counselled from. The facilities did not provide privacy and had no specific ANC consultation room. However, eighty percent of the ANC users were encouraged to deliver from the health facility.

Discussion

This research work which is an extract from the main study 'assessing the quality of Antenatal care provided to pregnant women in Lundazi district health facilities, Zambia' aimed at assessing the Engagement processes and procedures between ANC providers and pregnant mothers during the provision of antenatal care.

According to WHO (2018); Sheffel et al., (2019), effective communication between maternity care staff and women during Antenatal Care, labour and childbirth should include informing the client of findings, attending to clients in a timely manner, allocating sufficient time to each client, encouraging the woman to express her needs and preferences, regularly updating her and her family about what is happening, and asking if they have any questions.

This study revealed that only 37% of the ANC users were informed of the findings after being examined. ANC providers in all the five (5) health facilities reported that time limitation did not allow them to provide sufficient feedback to pregnant women during physical examination, because other clients were waiting outside. Some providers reported that they felt uncomfortable to take considerable amount of time with individual pregnant women in either counselling or individualized health education session for fear

that clients waiting outside would raise suscipicions that perhaps the health worker could be having carnal knowledge with a pregnant woman. So, it was entering, expose the abdomen, staff palpate and then leave quickly before the anxious community begins to gossip. As such clients were not asked if they had questions during consultations (table 1).

These findings tally with Phommachanh et al., (2019) who reported that Staff in ANC facilities did not share the physical examination findings with the clients. The same scholars reported that some providers did not ask the women about their needs, because they were afraid of not being able to fulfil the needs, which would be unacceptable for them. This study attributed this antiquated practice to lack of clinical drills and refresher courses in Antenatal care as it was reflected in the findings of this study where 60% of ANC providers from the five health facilities never had a chance of being trained or having any clinical drills on Obstetric emergencies (table 3) except for technical support.

It was also observed that the next ANC return visit date was communicated to the clients after consultation. However, antenatal mothers had the same appointment dates for subsequent visits regardless of the current gestational age or complaints. Health workers could not take consideration of grouping pregnant mothers according to gestational age for customized antenatal care. This study's findings are similar to the study findings by Miltenburg et al., (2016) in Tanzania which revealed that return date was usually standardly documented to be next month, independent of number of visits and that sometimes clients could be given a return date after the estimated date of birth.

Provision of ANC requires many different actions and skills; next to routine services it requires provision of adequate decision making, risk identification, clinical reasoning and proper client counselling (WHO, 2016; Miltenburg et al., 2016). Coverage of routine services alone is insufficient if information is not used or acted upon (Miltenburg et al., 2016). In this study, pregnant women with abnormal findings, maternal problems/complications in all the health facilities reported that they would be referred to the first referral level hospital. However, through Focus Group Discussions participants reported that ANC providers could not explain the reason for referral submitting that antenatal mothers would still not understand even if staff took the entire year explaining. This would make the clients either to take days before seeking care from the referred facility or not go at all. On the other hand, Miltenburg et al., (2016) in Tanzania argues that abnormal findings were rarely a reason for referral.

Prospects for a healthy outcome for both mother and baby improve when all women and families have adequate knowledge (Lincetto et al., 2016). Health education during antenatal is given to provide advice, education, reassurance and support (Mohammed and Amal, 2015). This implies that it should be given to ANC users from registration, during history taking, physical examination, investigations and dispersing of ANC medications). This study found that all the five health facilities pursued group health education of ANC clients with 12% of ANC providers using visual Aids during the sessions (table1).

In addition to group health education for antenatal mothers, it is important for health workers to provide individualized health education because 'individual health behaviours are embedded in cultural pattern exchanges and are usually transmitted from generation to generation (Kaewsarn et al., 2003). Oshinyemi et al., (2018) affirms that teachings on different topics make individual clients aware of danger signs and when to seek medical care. This study found that ANC users were not counselled to seek immediate medical care when they experience; blurred vision, severe headache, convulsions, fever and difficulties in breathing (table 1). Furthermore, the study observed that one to one individualized health education was not reinforced despite the gestational age of clients.

These results are similar to the findings of Phommachanh et al., (2019); Miltenburg et al., (2017); Ritchie et al., (2016); Ajayi et al., (2013) who observed that health education was given to a group of women, culture limited the giving out of health education and that little information was communicated to individual ANC clients and their relatives.

This study further revealed that all, (100%), the five health facilities had no distinct antenatal room for ANC consultations (table 1). Provision of antenatal care services was done either from the labour room or an office. The facility where the services were provided in an office had no

door to the improvised ANC room. To gain entry, antenatal mothers brushed past a dirty looking bed sheet serving as a door. In this office-like arrangement, nurses hustled-and-busted in and out of the room at any time. The room had no screens around the bed to provide privacy. Pregnant women fumbled to expose their abdomen due to heavily compromised privacy. Inadequate antenatal room for physical examinations and counselling room affects privacy and confidentiality. Findings of this study tally with the findings by Phommachanh et al., (2019) in their study conducted Asia; Jallow et al., (2012) in Gambia and Mills et al., (2007) in Kenya, Ghana and India. The researchers found that public health facilities especially in lower- and middle-income countries did not have proper physical environment to provide adequate privacy for counselling and physical examination. A similar study conducted in Zambia by Bwalya et al., (2018) at Kanyama and Matero Clinics in Lusaka found that rooms where staff interrupted compromised privacy and affected antenatal mothers' satisfaction with the care they received during antenatal visits.

Conclusion

This study found that there is less engagement between the ANC providers and Users. Even if ANC users attended ANC clinic as recommended by WHO (2016), interaction between the two partners of ANC was inadequate. This in turn affects the quality of Antenatal Care provision.

Efforts targeted at the provision of quality ANC care and reducing maternal mortality can only be successful if ANC providers engage the users in the care as well.

Recommendation

The study recommends that refresher courses on ANC engagement processes should be reforced and follow standard guidelines of ANC provision. This should also be emphasized by the Nursing and Midwifery training institutions.

Tables

Table 1. ANC Providers responses concerning educating clients on dangers signs

Counselling during consultation		**ANC providers' responses (questionnaire) N=75**	
		Yes	**No**
Counsel client to seek immediate medical care when she experiences;	Blurred vision	0	100%
	Severe Headache	0	100%
	Convulsions	0	100%
	Fever and weakness & Difficulty in breathing	0	100%
Counseled the client on when to return to the health facility for next visit		75 (100%), given same date for next visit	
Counseled clients on hospital delivery		60 (80%	15(20%)

Table 1, above shows that non o the clients were counseled on blurred vision, severe headache, Convulsions, fever, difficulties in breathing. All the respondents (100%) indicated that Clients were given the same date for review the majority, 80% advised clients to deliver from a health facility.

Table 2. ANC Providers responses concerning Physical examination (N=75)

Engagement during physical examination	**Yes**	**No**
Giving individualized health education	Not done	
Used visual Aids during health education	9 (12%)	66 (88%)
Asked the client whether there are any questions	Not done	
Explained head to toe examination findings	28 (37.3%)	47 (62.7%)
Availability of Private ANC consultation room	Not available in all (5) health facilities	

Table 2, above shows that ANC clients were not given individualized health education. The lesser percentage, 37% of the ANC providers explained the physical examination findings during ANC consultation. All the five facilities did not have separate rooms for ANC consultation.

Concerning referrals to the next facility, focus group participants shared their views concerning referrals to the hospital. Participant 3 from facility 'B' said,

If ANC providers find a problem when palpating our abdomen, they tell us to go to the hospital (Lundazi District Hospital). They don't tell t us why we are being referred. (Participant 3, 23years old).

Another participant from the same facility added saying, *Health workers tell us that even if they took a full year explaining the reason for referral, we would still not understand. They tell us to just go.*

Author's Contribution

PM was responsible for the study conception and design, data collection and analysis, drafting the manuscript. CM supervised the research process.

Acknowledgements

The authors are grateful to the Eastern province and Lundazi District health office team for approving the request to undertake this study. Many thanks go to the participants for their willingness and time divorted to participate in this study.

This information was extracted from a PhD thesis by Patricia Mambwe.

References

[1] Abou-Zahr CL and WardlawTM (2004). *Strategies for reducing maternal complications in the tropics.* International journal of reproductive health, 8(20), 68-88 accessed from https://www.google.com/search?sa=X&nirf=1.%09 on 9/10/2019 @ 05:32 hours

[2] Ajayi IO, Osakinle DC, Osakinle EO, Damilola C, Eunice O. *Quality assessment of the practice of focused antenatal care (FANC) in rural and urban primary health centers in Ekiti state*. Open journal of Obstetrics and Gynecology (2013) 3:319-26. Doi:10.4236/ojog.2013.33059 accessed from http://www.scirp.org/journal/ojog/ on 11/11/2019 @ 16:30 hours

[3] Barello.S, Graffigna. G, Vegni. E (2012*), Patient Engagement as an Emerging Challenge for Healthcare Services: Mapping the Literature* retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3504449/; doi:10.1155/2012/905934.

[4] Bwalya. C, Sitali. D, Baboo. S. K and Zulu. J (2018), *Experiences of Antenatal Care among pregnant adolescents at kanyama and Matero clinics in Lusaka, Zambia* accessed from https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-018-0565-9#Sec3 on 13/7/2020 @ 15:11 hours.

[5] Graffigna. G, Barello. S, Libreri. C and Bosio. C (2014), *How to engage type-2 Diabetic Patients in Their Own Health Management: Implications for Clinical Practice* retrieved from https://pubmed.ncbi.nlm.nih.gov/24966036/; Doi: 10.1186/1471-2458-14-648.

[6] Jallow et al., (2012), *women's perception of antenatal care services in public and private clinics in Gambia*, International journal for quality in Health Care, Vol 24, issue 6 , accessed from https://doi.org/10.1093/intqhc/mzs033 on 13/7/2020 @ 15:22 hours.

[7] Kaewsarn, P., Mayle.W., Creedy. D., (2003), *Traditional postpartum practices among Thai women.* J Adv Nurs' 41(4): 358-366 https://www.ncbi.nlm.nih.gov/pubmed/https://www.google/scholar.

[8] Lincetto et al., (2016), *Antenatal Care – World Health Organisation* accessed from https://www.who.int/pmnch/media/publications/aonsectionIII_2.pdf accessed on 14/7/2020 @ 01:01 AM.

[9] Nellan etal., (2019) *Antenatal care as a means to increase participation in the continuum of maternal and child healthcare: an analysis of the poorest regions of four Mesoamérican countries* accessed from https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-019-2207-9 on 13/7/2020 @ 05:20 hours.

[10] Mills. S, Bos. E, Lule. E, Ramana, G. N. V, and Bulatao.R (2007), "*Obstetric care in poor settings in Ghana, India, and Kenya,"* HNP Discussion Paper Series, retrieved from

[11] https://www.researchgate.net/publication/228872866_Obstetric_Care_in_Poor_Settings_in_Ghana_India_and_Kenya on 28/6/2020 at 10:27 hours.

[12] Milltenburg. A. S, Van der Eem. L, Nyanza. E. C, Pelt.S, Ndaki.P e tal., (2017), *Antenatal care and opportunities for quality improvement of service provision in resource limited settings: A mixed methods study* accessed on 16/11/19 at 06:57 hours

from https://journals.plos.org/plosone/article/file?type=printable&id=10.1371/journal.pone.0188279.

[13] Mohamad et al., (2017), *Patient experiences of engagement with care plans and healthcare professionals' perceptions of that engagement* accessed from https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-017-2806-y on 13/7/2020 @ 16:47 hours.

[14] Mohammed. A and Amal. A (2015), *Health education during antenatal care: the need for more*; International Journal of Women's health accessed from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4340373/#b21-ijwh-7-239 on 21/6/2020 @ 05:24 hours.

[15] Oshinyemi. E, Aluko. O and Oluwatosin.O (2018), *Focused antenatal care: Re-appraisal of current practices*; International Journal of Nursing and Midwifery accessed from http://www.academicjournals.org/IJNM; DOI: 10.5897/IJNM2018.0312 retrieved on 13/7/2020 @ 15:42 hours.

[16] Phommachanh e tal., (2019), *Improvement of Quality of Antenatal Care (ANC) Service Provision at the Public Health Facilities in Lao PDR: Perspective and Experiences of Supply and Demand Sides* Accessed from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6647136/ on 13/6/2020 at 23:53 hours.

[17] Sheffel et al., (2019), *Understanding client and provider perspectives of antenatal care service quality: a qualitative multi-method study* from Tanzania accessed from

[18] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6596286/ on 21/6/2020 @ 06:23 hours.

[19] Vlemmix et al., (2013), *Decision aids to improve informed decision-making in pregnancy care: a systematic review* accessed from https://obgyn.onlinelibrary.wiley.com/doi/10.1111/1471-0528.12060 on 13/7/2020 @ 06:31 hours.

[20] WHO (2018), *Recommendations on effective communication between maternity care providers and women in labour accessed from https://extranet.who.int/rhl/topics/preconception-pregnancy-childbirth-and-postpartum-care/care-during-childbirth/who-recommendation-effective-communication-between-maternity-care-providers-and-women-labour* on 21/6/2020 @ *08:10 hours.*

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art009

Effect of Inquiry-Based Teaching Method on Students Achievement and Retention of Concepts in Integrated Science in Senior High School

Mohammed Issaka
Texila American University
E-mail: irshadmohammed788@gmail.com

Abstract

This study purposely investigated the impact of using inquiry-based teaching method on students' academic achievement and retention of concept in integrated science against the traditional method in some selected senior high schools in the Obuasi Municipality. The study also investigated the difference in the mean achievement score between male and female students taught integrated science using inquiry -based method.

The sample for the study was 292 students in SHS two from Christ the King Catholic Senior High School and Obuasi Secondary Technical in the Obuasi Municipality. The sample were obtained through random sample technique.

The experimental group received instructions in integrated science using inquiry-based method of teaching whereas the control group were taught with the traditional method.

The data were collected through the use of pretest- posttest research design and were analyze according to the research question for the study. The main research question for the study was: What is the effect of inquiry-based method of teaching on students' achievement and retention of concepts in integrated science?

The results from the study indicates that the students in the experimental group performed better than the students in the control group.

The findings also show that students who were instructed with inquiry-based method have higher retention capacity than their counterpart students who were exposed to traditional method.

There was a slightly gender disparity in the achievement and retention capacity of both male and female students taught integrated science with inquiry-based method in favour of the male. This means that inquiry-based method is very rewarding to students in terms of achievement and retention regardless of gender.

Keywords: *inquiry-based method, integrated science, achievement, retention.*

Introduction

Globally, it is recognized that science is very important subject in the development of every nation. The compulsory nature of integrated science in the curriculum of pre-tertiary education system in Ghana confirms its usefulness in the development of individuals in the country. The development of a country rest on science and technology in the world of work. (Shadreck & Mambanda, 2012; Anamuah-Mensah, August 2004). Integrated science competency is a key determiner of individual student's post-secondary education and career options and much attention is given to it by stakeholders of education in the country. In Ghana for instance, students must obtain a pass mark in integrated science before they can get admission to any tertiary institution.

Stressing on its importance Azure (2015) observed that Science education is needed in Ghana to produce the necessary human resource and skilled labour force to manage our local industries and educational institutions. The study of integrated science helps us to understand our natural world and also to approach challenges we face in life and our workplace in a more systematic and logical manner. Integrated Science education in Ghanaian educational system is the conscious effort to raise the level of scientific literacy of all students and equip them with relevant basic scientific knowledge needed for their own living and also contribute

to the country's development. (Teaching syllabus for integrated science, 2010).

Despite its usefulness in determine students' post-secondary education in Ghana, students don't pay much attention to this subject. In the year 2018, the performance of students in integrated science drop from 52.89 percent in 2017 to 50.49 percent in 2018. In 2019, there was slight increase in their performance. This shows that there is more work to be done to improve students' performance in integrated science. The chief examiner has over the years reported students woefully failing in some of these topics in integrated science. Topics such as Magnetism, Animal Production, rock, hydrocarbons, acid base and salt and hereditary and inheritance have been yearly reported. (Chief Examiners report 2016, 2017 and 2018).

Due to its usefulness the method of teaching the subject should be of great importance to science educators. O'Connor (2000) observed that the use of inappropriate teaching methods contributes to the low participation and performance of students in science.

The methods employed by teachers in teaching science have a great impact on the understanding and interest developed by students in the subject. Sree (2010) opined that the method of teaching each subject play a pivotal role in enhancing the efficiency of the practitioners. Teaching involve both methodology and pedagogy and the teacher is supposed to select appropriate method which will effectively engage the learners in the teaching and learning process.

Tytler's (2003) was of the view that several studies have indicated that there is "a general problems with the teaching of science within secondary schools" (p.274), where much attention is focused on "the factual information, driven by textbook use and tests, lack of small group activity, negotiation of low level cognitive demand, and the concentration of conceptual activity in a minority of target students" (Tytler, 2003, p.274). Emphasizing on this Azure (2015) found out that students in senior high schools were not made to performed science practical activities in integrated science as suggested by the science curriculum. This has contributed to poor attitude shown by students towards science.

Wood and Gentile (2003) were of the view that educators are beginning to recognize that there are better ways to learn than the traditional methods. The traditional method of teaching is passive rather than active. It does not enhance critical thinking and collaborative problem solving since students are made to act as spectators and passive recipient of information. Science educators have from to time emphasize the need to produce students who are skilled in solving basic problems within their immediate environment through analysis and experimentation and adopting a scientific way of life based on pragmatic observation and investigation of phenomena. They also stress the need to encouraging students to develop interest and high motivation towards science. To achieve this, students should be expose to skills in creating their own knowledge in order to understand scientific concept rather than providing them with set of rules and already prepared concepts without understanding them. Students should be exposed to several strategies of solving problems and also providing them a conducive learning environment where they can learn through inquiry and so doing student are placed at the centre of the learning process.

Educators came up with inquiry based instructional strategy which employs active participation of learners in the teaching and learning process and also placed the learners at the centre of the teaching and learning process where the student is made to interact with teaching and learning materials (TLMs) and also asks questions to discover scientific concepts, facts, or principles with or without any teacher support.

Objectives of the study

The purpose of this study was to examine the effects of inquiry-based method of teaching science on the academic achievement and retention of students in integrated science in Senior high schools in Obuasi Municipality. The study will specifically:

1. Find the difference in the mean achievement scores between students taught integrated science using inquiry-based method and those taught integrated science using traditional method.
2. Find the difference in the mean achievement score between male and female students taught integrated science using inquiry -based method.
3. Find the difference in the mean retention scores between students taught integrated

science using inquiry-based method and those taught integrated science using traditional method.
4. Find the difference in the mean retention score between male and female students taught integrated science using inquiry - based method.

Research Questions

1. What is the difference in the mean achievement scores between students taught integrated science using inquiry-based method and those taught integrated science using traditional method?
2. What is the difference in the mean achievement score between male and female students taught integrated science using inquiry -based method?
3. What is the difference in the mean retention scores between students taught integrated science using inquiry-based method and those taught integrated science using traditional method?
4. What is the difference in the mean retention score between male and female students taught integrated science using inquiry - based method?

Significance of the Study

The study will help improve students' achievement in Integrated Science through showing high motivation and better attendance. This is because inquiry-based method ensures active involvement of students in the teaching and learning process and as students are made to practice what they learn, they develop interest and understanding in the lesson and be willing to attend class always.

It will also help Teachers see the need to use Inquiry Based Method in teaching Integrated Science. Most teachers still prefer the traditional method of teaching science to that of inquiry-based method despite its recommendations by several researchers.

It will be useful to the educational training institutions on the need to train teachers who will be able to use Inquiry-based method in teaching science. Teachers will be willing to use the inquiry-based method in teaching if it is incorporated into the teacher training program. Teachers will see it the need to use inquiry-based method in teacher integrated science.

Delimitations of the Study

There are several concepts in Integrated Science but this study only focusses on rocks, acid bases and salts, magnetism and inheritance and variations. These are the topics the chief examiner always reports students having difficulties in them in integrated science.

Limitations of the Study

The main limitation to this study was that the student initially resisted to the inquiry process and objected to their role as explorers. They were used to having the teacher as the main source of information and knowledge giver and they were to receive and read their textbook. They were not familiar with the teaching model in which the teacher asks questions and the students explore and search for the answers, supporting it with evidence and communicating their findings.

Also, there was the need to train teachers in extensive professional development in inquiry-based method of teaching and only two science teachers were willing to undergo such for the study.

Literature Review

The theory underpinning this study is constructivism. The constructivist maintain that learners construct their own knowledge and understanding of the world through experience by constantly asking questions or through inquiry. Basically, the concept of constructivism means encouraging learners to use active approach in experimentation and problem solving to generate more knowledge, discuss their findings and then reflect on the new ideas they have come across with their previous knowledge. Pr˚ucha, Walterov´a and Mareˇs, (2009) observed that the inquiry-based instruction is supported mainly by the cognitive constructivism that uses the didactic approaches based on the assumption that the constructive cognition is happening in the form of the cognized subject connecting the fragments of information from the outside to the meaningful structures, reconstructing the existing structures and performing the mental operations with them conditioned by a suitable level of the pupil's cognitive development (Pr˚ucha, Walterov´a and Mareˇs, 2009, p. 131). There it is very important for the students to take active part in their

cognitive development. The teachers can motivate them by engaging them through the questions they posed to them or giving them the opportunity to part in the formulation of the questions.

The inquiry based- instructions is closely related with thinking and development and it starting points is the knowledge provided by cognitive science. According to Dost´al (2015) this cognitive science is based in the cognitive psychology which creates cognitive models for the problem solving.

Consequently, the constructivist school is the one where the child knows and comes to the schools in order to think about their own knowledge, to organize it, deepen it, enrich it and develop it — in the group where the teacher ensures that every pupil can achieve the highest possible level (cognitive, social, operational) during the participation and contribution of each one of them. (Tonucci, 1994).

The ultimate purpose of constructivism is the learning and the process of constructing it. These processes have to do with engaging the students through discussions, project activities, exercises group works, presentations and by given them tasks which reflect their real world. The students then become motivated with common purpose of reaching the goal. The teacher become the architect of the thinking process; he/she enables it. (Dost´al 2015). He/she creates and assign "good" problems that stimulate investigation, and creation of the group activities which model and enable the process of knowledge construction.

The teacher who now acts as a facilitator makes sure he/she understands the previous knowledge of their students and then prepare activities to help learners promote learning.

According to Khalid and Azeem (2012) the constructivism assumes the role of the teacher as a facilitator who guides learners to create knowledge and understanding instead of producing series of facts.

In a constructivist classroom, the teacher assists the learners through inquiry-based learning activities and problem solving with which the students investigate on a problem, discuss their ideas share their ideas to the group and then contemplate on their new ideas in a collaborative learning environment. The constructivist theory has several benefits to both the teacher and the learner and one of such advantage is that it changes the learner from being a passive recipient of information to an active participant in the learning process. The teacher has the responsibility of guiding the learners to construct their own understanding and knowledge instead of becoming passive recipient of information from the teacher or the textbook. The teacher also has the responsibility of translating what is to be learned into a form relevant to the learner's current state of understanding. (khalid & Azeem, 2012).

This theory capitalizes on learning through inquiry and problem solving through critical and creative thinking. Asselin, Branch and Oberg (2003) were of the view that students' inquirers are encouraged to explore new ideas and understandings through personal discoveries and explorations as well as interactions with objects and with other people.

Olorundare (1992) was of the view that constructivism revolves around the tenets that individuals construct meanings in their attempt to make sense of the world around them. It is therefore very important for the classroom teacher to give access to the students to explore the classroom environment and also guides the students through problem solving and inquiry-based learning activities where students together investigation on a problem and come out with ideas to solve it. This environment must be full of educational materials that will compel the students to learn. The integrated science teacher must make available teaching and learning materials in the classroom environment.

A typical example of a structured inquiry-based learning approach is the learning Cycle Model from Piaget theory of cognitive learning (Bevevino, Denge, &Adams, 1999). Several versions of this learning cycle can be found in the science curricula with the phases ranging in number from 3E, 4E, 5E to 7E. The number of phases does not matter to this study every learning cycle has at its core the same purpose. This study will employ 5E learning by Bybee et al, (2006). It involves the instruction of five discrete elements:

i. Engagement: the prior knowledge of the students is review and also link them to the new concepts through the use of short activities that promote curiosity. The teacher makes connections between past and presents learning experiences. Students are

mentally engaging in the concept, process, or skills to be learned.

ii. Exploration: the teacher involves the students in the topic providing them the opportunity to build their own knowledge through investigating and researching and manipulating of the materials. Student build a set of common experience as they work in groups and this prompt sharing and communicating. At this stage, the teacher acts as a facilitator guiding the students focus and the students actively learn through inquiry-based learning process.

iii. Explanation: this face focus students' attention on particular aspect of their engagement and exploration experiences and provides students opportunity to demonstrate their findings, their conceptual understanding through discussion and presentations. It also provides the teacher the opportunity to introduce the concept, terms and explanations.

iv. Elaboration: After the discussion and explanations about the main ideas and terms for their learning tasks, it is important to involve students in further experiences that extends the concepts and process or skills. Students are encouraged to apply the concept to new situations.

v. Evaluation: At this stage the students are given the opportunity to demonstrate their understanding of the concept. The teacher can administer assessments to determine each student understanding of the concept learned.

Llewellyn 2016 identifies the following roles of the teacher in the structured inquiry.

i. Provides step-by step sequential procedures to be followed
ii. Provides material and supplies as listed in activity sheet or lab.
iii. Assigns role to students on rotating basis
iv. Acts as coach by ensuring all students are on task and understand the procedure
v. Encourage students to work as a group
vi. Ask probing questions and answers questions when appropriate
vii. Provides follow up and going further questions and inquires.

Inquiry- based science teaching methods

There are five inquiry-based teaching methods (Shamsudin and Abdullah, 2013). These are simulation, field study, demonstration, project, and experimentation.

i. **Simulation**

This inquiry-based science teaching consists of role play, model and games. During simulation, learners interact in a way where they become the test subject in the experiment. This strategy fits well with the principle of constructivism and effective way to assist students understands a concept. (Shamsudin and Abdullah, 2013).

According to Perry and et al (2009) simulation using model is a form of experimental learning and these instructional strategies enable the teacher to place the students in the world he/she created. Also, from the findings of Undo and Etiubons (2011) those students who were taught using computer-based science simulation attained better scores than those who were taught using traditional instructional method.

ii. Field study

This is an academic study which takes place in a natural setting other than in the classrooms or laboratory (Noel, 2007). Students normally study concepts through observation, discussions, picture taken as well as analysis of the data collected. These data collected can be in the form of specimen audio, video and pictures. This strategy does not allow active involvement of students but also help students develop an understanding and experience and the process of learning in a natural setting.

Harder (2010) opined that student and teachers found field study activity enjoyable because learning becomes more real and more challenging than those done inside the classroom and also help develop in the student the skills of gathering data through audio recording, picture taken, video recording and collection of specimens for science activities.

iii. Demonstration

McFarland (2005) observed that demonstration is very useful in promoting students learning through proving the truth of something through evidence.

It is true that it can be a tedious task for the teacher. For instance, the teacher has put in a lot of works design set up and think on the best way to carry out the demonstration, but the end results can be extremely positive. (Shamsudin and Abdullah, 2013).

Mc Farland (2005) also opined that through demonstration the classroom interaction tends to be less unidirectional as the students begin to get involved and ask several questions about science except using demonstration as a teaching method replaces the teacher as a source of knowledge and the teacher becomes more creative while students learn to respect the diverse of other students.

iv. Project Work

This inquiry-based science education focuses on the work given by the teacher for teacher students to carry out in groups. Hiang (2005) suggested that there should not be more than three students to a group and the group should invent a project for the discovery content purpose.

Project work has several benefits to the students it allows for more meaning understanding of science concepts among students and enhances academic performance. According to Kanter and Kontantopoulos (2009) project work enable teachers to develop their science content knowledge as well as their science pedagogical content knowledge as they prepare and facilitate students work.

v. Experimentation

Experimentation is core of doing investigation in science classroom. (Shamsudin and Abdullah, 2013). Experiment encourages students' interest in learning science as they get the opportunities to manipulate objects test hypothesis and work together to solve or prove something exciting. Students are able to see or relate concepts better and contribute to sound science concepts.

According to Demeo (2005) experiments help produce more mature type of science education when students are allowed to manipulate things in the experiment. It also makes science become practical for the students instead of always reading scientific theories and contents.

Integrated Science Education in Ghana

In Ghana science education is administered under the purview of Ministry of Education. The ministry is responsible for the formulation of national science education objectives. The ministry of education oversees all the activities of Ghana education service which is responsible for pre-tertiary education in Ghana.

The Ghanaian integrated science curriculum follows the "spiral approach" treating the same themes at different times and greater depths within each educational level. The integrated science curriculum is the replacement of what is used to be called 'nature study'.

At both primary and junior high school level, pupils are made to study integrated science. They learn basic scientific ideas and concepts and how to develop the spirit of curiosity and open mindedness. The main teaching philosophy is inquiry-based which is aimed at providing the learner the opportunity to expand, change, enhance and modify the ways in which they view the world. (GES new science syllabus). It also enforces the teacher to use learner-centered approach in in teaching and learning process which the learner is physically and cognitively present in the knowledge acquiring process in a in a rich and rigorous inquiry-driven environment.

The Ghana science education philosophy at the basic level view science learning as 'an active contextualized process of constructing knowledge based on learners' experiences rather than acquiring it'. Learners are view as information constructors who operate as researchers and the teachers serve as facilitators by providing the enabling environment that promotes the construction of learners' own knowledge based on their previous experiences.

At Senior high school level, the integrated science curriculum comprises the general science and the agricultural science and the environment. The content of the Senior high school integrated science covers basic sciences and these includes Health, Agriculture and industry and it is expected that every student passes this subject before gaining admission into any tertiary institution in Ghana.

The SHS integrated science syllabus covers a three-year period with each year work organized

under five themes. These themes are Diversity of Matter, Cycles, Systems, Energy and Interaction of Matter. The above five themes also form the five sections of the syllabus for each of the three years‟ work. These themes consist of topics from biology, physics, chemistry and agricultural science.

Materials and Methods

The study employed a quasi-experimental non-randomized pre-test, post-test control group design. This design was adopted because it was not possible to have complete randomization of subjects as this will disturb school organization. According to Vanderstoep and Johnson (2009), quasi-experimental design is an empirical study used to estimate the causal impact of an intervention on its target population. Therefore, intact classes were randomly assigned to experimental and control groups.

In this study, the target population consists of 1200 SHS Two Gold students from Christ the King Catholic Senior High School and Obuasi Secondary Technical Senior High School in the Obuasi municipality.

In determining the sample size for the study, the table for determining sample size from a given population suggested by Krejcie and Morgan 19 was used.

A total of 292 students were selected from the target population. This comprises 77 boys and 69 girls from the two senior high schools in the municipality. There are 146 students in the experimental group and 146 students in the control group. Four intact classes from each of the two sampled school were selected using simple random sampling. They were assigned randomly to experimental and control groups. The experimental group comprised four intact class while the control group also comprised four intact classes. The researcher used Integrated Science Achievement Test (ISAT), semi- structured interview guide and observation to collect data needed to answer the research questions guiding the study. The test items were constructed from the topics that were taught in the class during the interventional process.

Intact classes were assigned to both the experimental and the control groups after which the Integrated Science Achievement Test (ISAT) was administered as pre-test this took one week before the actual teaching began. During the treatment period the experimental group were taught some selected topics in integrated science using inquiry-based method. The control group was also taught the same topics using traditional method. The actual teaching took four weeks to cover all the selected concepts.

After the treatment the pre-test were reshuffled and administered as post-test to both groups. The post-test was marked by the research assistants with the marking scheme prepared by the researcher. The researcher then allowed a gap of four weeks and reshuffled the post-test and re-administered it again to ascertain if the knowledge gain was retained. This was to measure the retention of concepts learned during the intervention period. The retention test was scored analyzed.

Results

The data collected for the study was analyzed and interpreted based on the research questions formulated. Table 3-7 presents the results on the research questions.

Table 1. Analysis of students' data

Treatment Group	N	Frequency	Percentage
Experimental group	146	146	50
Control group	146	146	50
Total	292	292	100

The results in the table 1 shows the number of students in the study. The experimental group were 146 indicating 50% and the control group were also 146 indicating 50% of the treatment group.

Table 2. Analysis of the sex of the experimental group

Sex	N	Frequency	percentage
Male	77	77	52.7
Female	69	69	47.3
Total	146	146	100

The table 2 above shows that the male in the experimental group is 77 corresponding to 52.7% and the female were 69 indicating 47.3% of experimental group**.**

Research question 1: What is the difference in the mean achievement scores between students taught using inquiry-based method and those taught integrated science using traditional method.

Table 3. Mean achievement and standard deviation scores of students in the pre-test.

Treatment Group	N	Mean	Standard deviation
Experimental group	146	10.79	1.42
Control group	146	10.79	1.39
Mean difference		0.07	

The table above shows that the pre-test means scores for the experimental and the groups were 10.79 and 10.72 respectively with their standard deviation scores of 1.42 and 1.39 respectively. The mean difference is 0.07.

Table 4. Mean achievement and standard deviation scores of students taught integrated science using inquiry-based method and those taught using traditional method

Treatment Group	N	Mean	Standard deviation
Experimental group	146	24.18	13.3
Control group	146	16.35	2.27
Mean difference		7.83	

The table above shows that the post-test means scores for the experimental and the control group were 24.18 and 16.35 respectively with standard deviation scores of 13.39 and 2.27 respectively. The mean difference is 7.83. The overall mean difference between the two groups was 7.76 in favour of the experimental group. This implies that the experimental group who were taught with inquiry-based method have achieved better than the control group who were taught with the traditional method.

Research question 2: What is the difference in the mean achievement score between male and female students taught integrated science using inquiry -based method?

Table 5. Mean achievement and standard deviation scores of male and female students in the pre-test

Treatment Group	N	Mean	Standard deviation
Male	77	10.60	1.11
Female	69	10.25	1.69
Mean difference		0.35	

The results in the table above shows that the pre-test mean scores for male and females were 10.60 and 10.25 respectively. With standard deviation scores of 1.11 and 1.69 respectively. Their mean difference is 0.35.

Table 6. Mean achievement and standard deviation scores of male and female students taught integrated science using inquiry-based method. Post-test

Treatment Group	N	Mean	Standard deviation
Male	146	77	24.47
Female	146	69	23.88
Mean difference		0.59	

The results in the above table shows that the post-test mean scores for male and female taught integrated science using inquiry-based method was 24.47 and 23.88 respectively with standard deviation of 1.77 and 1.61 respectively. Their mean difference was 0.59. The overall mean difference for both sexes was 0.24 in favor of the male males which is very small. This means that the male achieved slightly higher than their female counterparts in integrated using inquiry-based method.

Research question 3: What is the difference in the mean retention scores between students taught using inquiry-based method and those taught integrated science using traditional method?

Table 6. Mean retention and standard deviation scores of students taught using inquiry-based method

Treatment Group	N	Mean	Standard deviation
Experimental group	146	24.33	**1.77**
Control group	146	14.32	**2.32**
Mean difference		10.10	

The results in table 6 shows that the retention tests score for both the experimental and control group was 24.33 and 14.23 respectively with standard deviation of 1.77 and 2.32 respectively. From table 3, the pre-test mean score for both the experimental and control group were 10.79 and 10.72 respectively. The overall mean difference between the two groups was 10.03 in favour of the experimental group. This means that the experimental group has higher retention rate than the control group.

Research question 4: What is the difference in the mean retention score between male and female students taught integrated science using inquiry -based method?

Table 7. Mean retention and standard deviation scores of male and female students taught using inquiry-based method

Treatment Group	N	Mean	Standard deviation
Male	77	24.65	1.70
Female	69	24.22	1.63
Mean difference		0.43	

The results in table 7 shows that the retention tests score for both the male and female was 24.65 and 24.22 respectively with standard deviation of 1.70 and 1.63 respectively. From table 5, the pre-test mean score for both male and female were 10.60 and 10.25 respectively. The overall mean difference between the two groups was 0.08 in favour of the male. This means that the male students' retention capacity is slightly higher than their female counterpart in integrated science when using inquiry-based method in teaching.

Discussion of Findings

The results of this study show that students taught integrated science with inquiry- based method achieved better than their counterpart students taught using traditional method. This finding agrees with Wonkyi and Adu (2016) who found out that students exposed to inquiry-based method performed better circle theorem in mathematics than their counterpart students who were exposed to traditional method in circle theorem. Also, the findings agree with Riordan

and Noyce (2001) who found out that students taught using inquiry-based programs as their primary mathematics curriculum performed significantly better than students taught using traditional approach. The likely explanation for this outcome might be connected to the fact students taught with inquiry-based method had the opportunity to construct their own understanding of the concept taught in the class so deep learning occurred. According to Khalid and Azeem (2012) the constructivism assumes the role of the teacher as a facilitator who guides learners to create knowledge and understanding instead of producing series of facts.

It was also found out that students exposed to inquiry-based method have higher retention capacity than their counterpart students who were exposed to traditional method. This finding agrees with Ali (2012) who found that students have higher retention capacity when they are actively engaged in solving problems through hands-on activities than when they become passive learners as obtained in the use of traditional method. This outcome can be attributed to the fact students had the opportunity to understand and reflect on what was taught in the class therefore they were able to retain and reproduce what was taught in the class.

Again, the study revealed that the male students achieved slightly higher than their female counterparts using inquiry-based method. This difference is very small that it has no impact or significant. This finding agrees with the findings of Oluwatosin (2015) who found out that there was no significant statistical difference between male and female students taught chemistry with inquiry method. Also, Omokaadejo (2014) found that there is no significant difference between male and female SS2 students in their Chemistry academic performances implying that both gender benefit from the inquiry teaching method.

According to this finding it means achievement in integrated science does not depend on gender. Inquiry-based method can therefore be used to bridge the gap i*n achievement between male and their female counterpart.*

Also, the findings of this study show that there is no significant difference between gender and retentions. This means that both male and female students can retain what is taught in integrated science using inquiry-based method.

Conclusion

The use of inquiry-based method enhanced students' achievement and retention in integrated science than traditional method. There was a slightly gender disparity in the achievement and retention capacity of both male and female students taught integrated science with inquiry-based method in favour of the male. This means that inquiry-based method is very rewarding to students in terms of achievement and retention regardless of gender. Also, there was no effect on interaction between the method and gender in students' achievement and retention in integrated science. This therefore implies there is no need for separate method for both male and female since inquiry-based method could be successfully used for both.

Acknowledgements

To Allah be the glory, Honour and praises. I thank Almighty Allah for giving me knowledge and strength to undertake this study successfully. I would like to express my sincere gratitude to my mother, Madam Ayishetu Yusuf for her daily prayer and encouragement. Many thanks to my wife and brothers especially Nurudeen Abass for lovely support and caring. Finally, I would like thank all the workers of Texila American University for their wonderful support.

References

[1] Akpan, O. E. (1992). Towards creative science teaching and learning in West African schools. Cape Coast: Catholic Mission Press.

[2] Asselin, M., Branch, J. & Oberg, D. (Eds). 2003. Achieving information literacy standards for school library programs in Canada. O.N: Canadian School Library Association. (atas talian)
http://ednet.edc.gov.ab.calk-12/curriculum/by

[3] Azure, J.A. (2015). Senior High School Students' views on the teaching and learning of integrated science in Ghana. Journal of Science Education and Research, 1(2), 49-61

[4] Bybee, R. W., Taylor, J.A., Gardner A., Scotter, P. V., Powell, J.C., Westbrook, A. & Landes, N. (2006). The BScs 5e instructional model: origins and effectiveness. Office of Science Education National Institutes of Health. 1-80.

[5] Cooper, J. M. (1990) (Ed.). Classroom teaching skills. Toronto: D. C. Heath and Company.
[6] CRDD (2010) *Integrated science Syllabus for Senior High School*. Curriculum Research and Development Division.
[7] Demeo, S. (2005). Gazing A Hand: A Foulcaltion View of the Teaching of Manipulative Skills to
[8] Introductory Chemistry students in the United States and the Potential for Transforming Laboratory Instruction. Retrieved April 5, 2012, from http://onlinelibrary.wiley.com/doi/10.1111/j.1467-873X.2005.00330.x/pdf
[9] Hiang, P. S. (2005). Pedagogy of Science. Kuala Lumpur: Percetakan Sentosa (K. L) Sdn.Bhd
[10] K.Adu-Gyamfi (2014) Using activity method to enhance students' performance in energy transformation.
[11] K.J. Sree (2010) Methods of Teaching Science Discovery Publishing House.
[12] Khalid, A., & Azeem, M. (2012). Constructivist vs. traditional: Effective instructional approach in teacher education. International Journal of Humanities and Social Science, 2(5), 170–177.
[13] Davar, M. (2012) Teaching of Science PHI Learning Limited
[14] McFarland, E. (2005). Using Demonstration in Teaching Physics. La Physique Au Canada, 87-89
[15] Mensah, S. K. E. (1992). Source book for science tutors' professional studies.
[16] Shamsudin, M. N and Abdullah, N. "Strategies of Teaching Science Using an Inquiry based Science
[17] Education (IBSE) by Novice Chemistry Teachers", Procedia - Social and Behavioral Sciences, vol. 90, no.10, (2013), pp.583-592.
[18] O'Oconnor, J. P. (2002). Teachers are the problem in SMT, not girls. Retrieved on January 9, 2009 from http://www.adea.org
[19] Okoroafo, S. (2014). Gender difference in secondary school students' academic achievement in Science. *Australian Science Teachers Journal,* 23(6), 23-25.
[20] Oluwatosin V. A. (2015). effect of hands-on activities on senior secondary chemistry students' achievement in chemistry. Benue State. *achievement in Basic Science*. Unpublished M.Ed Dissertation, Tai Solarin University of Education, Ogun State, Nigeria.
[21] Olorundare, A. S. (2014). *Correlates of poor academic performance of secondary school students in the sciences in Nigeria*. Paper presented at the International Institute for Capacity Building in Higher Education, Virginia State University, Virginia, USA. 20th – 31st June, 2014.
[22] PR˚UCHA, Jan, Eli˘ska WALTEROVA and Ji˘ ´ r´ı MARES. ˘ Pedagogick´y slovn´ık. Praha: Port´al, 2009. 395p. ISBN 978-80-7367-649.
[23] Shadreck, M. & Mambanda, I. (2012). Science teacher quality and effectiveness: Gweru Urban junior secondary school students' point of view. Asian social science, 8(8), 121-135.
[24] Tytler, R. (2003). A Window for a Purpose: Developing a framework for describing effective science teaching and learning. *Research in Science Education, 33*. pp. 273---298. Kluwer Academic Publishers
[25] Perry, J. N. (2009). What is Simulation? Retrieved February 18, 2011, from Saskatoon: http://olc.spsd.sk.cs/DE/PD/INSTR/strats/simui/index.html
[26] Udo, M. E. (2011). Computer-Based Science Simulations, Guided-Discovery and students' Performance in Chemistry.
[27] Wood, W.B & Gentile, J.M. (2003). Teaching in a Research Context. Science, 302:1510.
[28] Yager, R.E. (1991). *What research says to the science teacher, volume seven. The science and technology, society movement.* Washington D.C. National Science Teachers Association
[29] Yara, O, P., 2009. Students' attitude towards mathematics and academic achievement in some selected secondary schools in South Western Nigeria. European Journal of Scientific Research, 36 (3): 336-341.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art010

The Prevalence of Malaria amongst Adults in Remote Primary Health Care Facility in South-South Nigeria

Oche Prince I[1]*, Ndukwu Geraldine U[2]
[1]*Physician, medical services, International SOS, Port Harcourt, Nigeria*
[2]*Department of Family Medicine, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria*
**Corresponding Author: princeoche22@gmail.com*

Abstract

Malaria is a serious public health burden with high morbidity and mortality in Nigeria accounting for 60% outpatient visits, 30% childhood mortality, 25% infant mortality and 11% maternal mortality, respectively, in the country. Malaria is endemic in Nigeria with consequent high economic burden. Malaria is one of the leading causes of death in Nigeria. The prevalence of malaria is high in Nigeria resulting from several climatic, bioenvironmental and socio-demographic factors. Malaria prevalence is higher amongst dwellers with high poverty and illiteracy levels. The prevalence of malaria was evaluated retrospectively in this study using clinical records over 12 months in a remote primary healthcare facility in South-South Nigeria. The findings show varied malaria prevalence rates amongst the months, with 3 months below 50% and the remaining 9 months above 50%. The overall period prevalence was 56% (541/966). The high prevalence rate reported in this study reflects the endemicity of malaria in Nigeria and is consistent with other reports that malaria prevalence is higher in the south-south Nigeria than observed with other regions of the country. The study prevalence 56% is twice higher than the average national period prevalence of 23%.

Keywords**:** *malaria prevalence, malaria prevalence determinant factors.*

Introduction

Malaria is a serious epidemiological burden in Nigeria and Africa characterized by high morbidity and mortality rates (Adu-Gyasi et al, 2018; Megnekou et al, 2018). Of the 228 million global malaria cases reported in 2018, Africa accounted for 93% and Nigeria 25%. The world malaria prevalence improved in 2018 by 23 billion cases compared to 251 million cases reported in 2010 (WHO, 2017 & 2019). The prevalence of malaria reflects frequent hospital visits and admission, with varied mortality rates among different population groups.

In Nigeria, malaria accounts for 60% outpatient visits, 30% childhood mortality, 25% infant mortality and 11% maternal mortality, respectively (NMEP). Malaria is not without economic burden as millions of naira ((Nigerian local currency) are involved with malaria management and control in Nigeria. According to the National Malaria Elimination Programme (NMEP), Nigeria loses 132 billion naira to malaria per year from prevention, control, treatment and man-hours loss. Malaria is one of the leading causes of death in Nigeria (Khanam 2017). However, in 2018, Nigeria had the largest reduction in malaria deaths in the world from 153,000 deaths in 2010 to 95000 (WHO, 2019).

The prevalence of malaria in Nigeria has differed in various periods, amongst the geopolitical regions, age groups and rural/urban (Dawaki et al, 2016). In south-south region, period prevalence of malaria was reported at 72.7%, 46.6% and 43.1% at various periods in Rivers state (Amala & Nwibani, 2015; Nzeako, Nduka & Origie, 2013; Wogu & Nduka, 2018) and at 71.4% in Cross River state (Udoh, Ita & Odey, 2013). Though south east recorded 40.5% (Uneke, Ogbu & Nwojiji, 2006) at a time, Enugu state in the same region reported a much higher period prevalence of 85.7% (Ayogu et al, 2016). South-west region has shown much lower period prevalence of 14.7% (Lagos state) and 15% (Ogun state), respectively (Aina, Agomo, Olukosi, Okoh, Iwalokun, Egbuna et al, 2013; Okangba, Ejikwu, Shobowale, Shonekan & Nwadike, 2016). North-west Nigeria reported

60.6% (Dawaki et al, 2016; WHO, 2019) and 32.4% in Kano state and 46.6% in Zamfara state (Garba, Muhammed, Musa et al, 2016). The average national period prevalence of malaria is declining however. In 2010, Nigeria period prevalence of malaria was 42% which reduced tremendously to 27% in 2016 and 23% in 2018 (WHO, 2016, 2018 & 2019).

Several factors have been reported responsible for malaria prevalence in Nigeria ranging from bioenvironmental factors through educational status of the citizens to medical conditions and physiological states (Bassey & Izah, 2017; Garba, Ameh, Whong and Aminu-Mukhtarl, 2016; Seiyaboh et al, 2016; Ukaegbu et al, 2014). The common bioenvironmental factors are bushy and water-collecting environments that promote the breeding of the malaria parasite *(Plasmodium)* vector *Anopheles mosquitoes*. Level of education has been correlated with malaria vector control protocols adherence, with those having advanced education known for better adherence rates. Medical conditions like diabetes mellitus, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDs), cancers and other chronic conditions that reduce immunity are a risk to contracting malaria. Understanding the risk groups and factors for malaria prevalence is fundamental to the management of the disease.

Symptoms associated with malaria are not specific to the disease. Chief among the symptoms is fever with different patterns depending on the *Plasmodium* species; *falciparum, ovale, vivax, malariae and knowlesi* as the common five human-infesting species (Wongsrichanalai, Barcus, Muth, Sutamihardja & Wernsdorfer, 2007). Other non-specific malaria symptoms are weakness, malaise, headaches, joint pains, muscle pains, poor appetite, haematuria (blood in urine), vomiting, diarrhea, abdominal pain (Khanam, 2017). The burden of febrile disease in Nigeria and Africa is high, which necessitates diagnostic work ups of any febrile presentation at health facilities of any categories (Abdullah et al, 2017; Crump & Kirk, 2015). Parasitological testing is essential in malaria management.

Plasmodium falciparum remains the predominant species in Africa (including Nigeria) and it is the species that causes cerebral and fatal malaria in most cases (Griffin et al, 2010). *P. falciparum* accounts for most complicated and fatal cases of malaria in Nigeria as also reported across other African countries. Female *Anopheles mosquito* species (*Anopheles gambiae*) is the vector that bears the malaria parasite Plasmodium spp., which promotes the transmission of malaria (Ayogu, Ukwe, & Nna, 2016). However, *Plasmodium vivax* is the most predominant species outside Africa.

Malaria can be catastrophic in certain vulnerable individuals because of reduced, poor or impaired immunity. Malaria has poor outcomes in neonates, infants, under five (U-5) children, pregnant women, and persons having haemoglobinopathies, chronic diseases and/or on chemotherapy (Ayogu et al, 2016; WHO, 2019).

Prompt and appropriate management of malaria following parasitological testing cannot be overemphasized, to avoid complications and resistance (Ayogu et al, 2016). Also, parasitological testing will help to determine the burden of malaria in the country and enable for planning and implementation of interventions to eradicate malaria from the country. Malaria is routinely diagnosed with microscopy and rapid diagnostic tests in health facilities. Microscopy is the gold standard and it requires expertise for reliable detection of malaria parasites (*Plasmodium spp*.).

Malaria elimination from the country is actually a daunting goal because of the unique and complex sociocultural composition of the population and poor political commitment of the country (Aribodor, Ugwuanyi & Aribodor, 2016). The prevailing poverty condition and poor literacy level in the country underline the difficulty in reducing malaria prevalence, if not eliminating the febrile illness/disease (World Bank, 2019).

Given the burden of malaria in Nigeria, the study aimed at evaluating the period prevalence of malaria in a remote Primary Health Care facility in South-South Nigeria, using microcopy. This will result in proper channeling of scarce resources at the peak period of transmission in order to eradicate or reduce drastically the transmission of malaria.

Materials and Methods

This retrospective study evaluated positive malaria cases as documented in the study clinic's records over 12 months from September

2017 to August 2018. The study site is a 'remote Primary Health Care (PHC) facility' in South-South Nigeria (a rainforest zone with high malaria transmission), using Giemsa-stained microscopy as the malaria diagnostic test method. The clinic sees adult population with a handful of females, males being the predominant gender in the study site.

The clinic laboratory is operated in good conditions with constant power supply and by two professional scientists who read microscopic slides according to international standard practice and the local protocol.

Every case of suspected malaria in the clinic is investigated using either Giemsa-stained microscopy or rapid diagnostic test, but the study considered cases tested with microcopy. The population studied was 966 cases tested for malaria by Giemsa-stained microscopy as extracted from the clinic's records over the 12-month period.

For statistical analysis, the author used the formula below to calculate the 'period prevalence' of malaria over a 12-month period.

$$\text{Prevalence} = \frac{\text{Positive Malaria cases}}{\text{Total population at risk over the 12-month period,}} \times 10^n$$

where $10^n = 100$

The numerator is the positive cases of malaria and the denominator is the total population tested or studied for malaria in the specified period.

Results

The results displayed in the respective table 1 and figure 1 show the respective monthly malaria prevalence rates per 100% from September 2017 to August 2018 (12-month period).

From both table 1 and figure 1, three months in 2018 (February, July and August) had below 50% malaria prevalence rates. The remaining 9 months recorded prevalence rates of malaria above 50%. The lowest malaria prevalence rate was 45% (August, 2018) and the highest was 71% (June, 2018).

However, the overall 'period malaria prevalence' with respect to the total microscopy positive cases and the total number tested is 56%.

Discussion

This study has shown different monthly prevalence rates of malaria. Three months have respective malaria prevalence rates below 50% and the rest 9 months have above 50%. But the study overall period prevalence of malaria is 56% (i.e. the no of positive cases over total cases times 100). This implies that for every 100 Nigerians 56 persons have malaria in the study area which depends on several factors as discussed in the introduction (Bassey et al, 2017). This study finding at 56% is twice higher than the national average malaria prevalence (23%) reported in 2018 (WHO, 2019). Malaria prevalence is not stable neither consistent all year round, across regions and among age groups. The study results imply that malaria prevalence is dynamic as it varies in different periods (Nigeria Malaria Fact Sheet, 2011). The understanding of the determinant factors of malaria prevalence is helpful in instituting malaria elimination programmes and control protocols.

Several studies have reported varied malaria prevalence rates in different geopolitical regions and socio-demographic strata (Dawaki et al, 2016). The study overall period prevalence of malaria at 56% is much higher than 14.7% in Lagos state (Okangba et al, 2016) and 15% in Ogun state in south-west Nigeria (Aina et al, 2013). Also, the index prevalence is higher than 32.4% in Kano state in north-west Nigeria (WHO, 2019), 40.5% in south-east Nigeria (Uneke et al, 2006), 40.8% and 43.1% in Rivers state in south-south Nigeria (Amala et al, 2015; Wogu et al, 2018) and 46.6% in Zamfara state in north-west Nigeria (Garba et al, 2016). However, the study prevalence (56%) is lower than 60.6% in Kano state in north-west Nigeria (Dawaki et al, 2016), 71.4% Cross River state in south-south Nigeria where the index study was conducted (Udoh et al, 2013), 72.7% in Rivers state in south-south Nigeria (Nzeako et al, 2013) and 85.7% in Enugu state in south-east Nigeria (Ayogu et al, 2016). The authors' finding shows that the prevalence of malaria is more in the south-south and south east than in the north and west.

Garba et al (2016) reported different malaria prevalence in different seasons among blood donors. Malaria prevalence amongst the group was 9.2% in wet (rainy, April to October) and 4.9% dry (November to March) seasons,

respectively. The study site is one of the rainforest zones of Nigeria and rainy season would have contributed to the high malaria prevalence observed in this study. Though socio-demographic characteristics such as lifestyles, poverty, age and gender, level of education and environmental control status of the population were not considered in the study they could have contributed as well. Climatic impact notwithstanding, other factors like high income and level education can blunt this effect on malaria prevalence. Malaria burden is highest in rural settings where level of poverty and illiteracy is high (Bassey et al, 2017).

Limitation

Though socio-demographic characteristics such as lifestyles, poverty, age and gender, level of education, environmental control and status of the population were not considered in the study they could have contributed as well. Other factors like high income and level education can blunt this effect on malaria prevalence. Malaria burden is highest in rural settings where level of poverty and illiteracy is high**.**

Conclusion

In the index study, the high malaria prevalence reported is a reflection of malaria endemicity in Nigeria. A lot of funds – indigenous and foreign – have been plunged into several malaria control programmes and one would expect much reduction in the prevalence of malaria. The malaria elimination programmes in the country would require intensive commitment from all involved stakeholders (governments, private organizations, health institutions and the citizens in order to reduce malaria prevalence.

Table and Figure

Table 1. Malaria Prevalence (N = 966)

Month/Year	Suspected cases	Microscopy Positive (Plasmodium falciparum)	Microscopy Negative	Prevalence rate per 100%
Sept. 2017	68	38	30	56%
Oct. 2017	86	51	35	59%
Nov. 2017	95	54	41	57%
Dec. 2017	60	37	23	62%
Jan. 2018	75	47	28	63%
Feb. 2018	92	42	50	46%
Mar. 2018	102	65	37	64%
Apr. 2018	84	51	33	61%
May 2018	91	55	36	60%
Jun. 2018	14	10	4	71%
Jul. 2018	124	57	67	46%
Aug. 2018	75	34	41	45%
Total	**966**	**541**	**425**	
Prevalence = positive cases / Total Suspected cases X 100 = 541/966 X 100 = 56%				

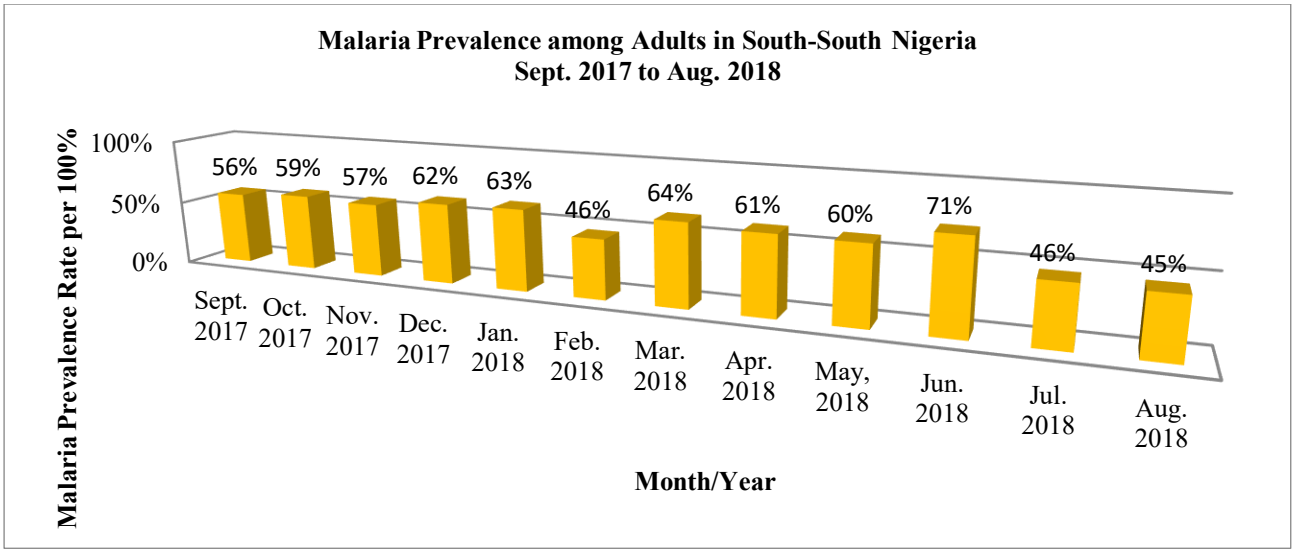

Figure 1. Bar Chart Presentation

Reference

[1] Abdullah, M., Tazeen, A., Hisamuddin, M., Naqvi, I. H., Verma, H. N., Ahmed, A., Parven, S., 2017, A clinical report on mixed infection of malaria, dengue and chikungunya from New Delhi, India. *Indian Virological Society*, 28(4), 422–424. https://doi.org/10.1007/s13337-017-0404-6.

[2] Adu-Gyasi, D., Asante, K. P., Amoako, S., Amoako, N., Ankrah, L., Dosoo, D., Tchum, S. K., Adjei, G., Agyei, O., Amenga-Etego, S., and Owusu-Agyei, S., 2018, Assessing the performance of only HRP2 and HRP2 with pLDH based rapid diagnostic tests for the diagnosis of malaria in middle Ghana, Africa. *PLoS ONE,* 13(9), e0203524. https://doi.org/10.1371/journal.pone.0203524.

[3] Aina, O., Agomo, P., Olukosi, Y., Okoh, H., Iwalokun, B., Egbuna, K. et al, 2013, "Malariometric survey of Ibeshe community in Ikorodu, Lagos State: dry season." Malaria Research and Treatment, 13. doi: 10.1155/2013/487250.

[4] Amala, S. E. & Nwibani, C. P., 2015, "Malaria in pregnancy and its association with ABO blood group and haemoglobin genotype." International Journal on Developmental Research, 5(8), 5317–5320.

[5] Aribodor, D. N., Ugwuanyi, I. K. & Aribodor O. B., 2016, Challenges to Achieving Malaria Elimination in Nigeria. American Journal of Public Health Research, 4(1), 38-41. doi: 10.12691/ajphr-4-1-6.

[6] Ayogu, E. E., Ukwe, C. V., and Nna, E. O., 2016, Assessing the reliability of microscopy and rapid diagnostic tests in malaria diagnosis in areas with varying parasite density among older children and adult patients in Nigeria. Journal of Postgraduate Medicine, 62(3), 150 – 156. doi: 10.4103/0022-3859.183167.

[7] Bassey, S. E. & Izah, S. C., 2017, Some determinant factors of malaria prevalence in Nigeria. Journal of Mosquito Research, 2(7), 48-58. doi:10.5376/jmr.2017.07.0007.

[8] Bassey, S. E. and Nwakaku, I. L., 2017, Prevalence of Malaria Parasitemia among Children between 1-10 Years Old Attending Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria. EC Pharmacology and Toxicology, 3(2), 43-48.

[9] Crump, J. A. & Kirk, M. D., 2015, Estimating the burden of febrile illnesses. PLoS Neg | Tropical Diseases, 9(12), e0004040. doi: 10.1371/journal.pntd.0004040.

[10] Dawaki, S., Hesham, M. A., Init, I., Jamaiah, I., Atroosh, W. M., Abdulsalam, A. M., Sady, H., Elyana, F. N., Adamu, A. U., Yelwa, S. I., Ahmed, A., Al Areeqi M. A., Subramaniam, L. R., Nabil A. Nasr, N. A., & Lau, Y., 2016, Is Nigeria winning the battle against malaria? Prevalence, risk factors and KAP assessment among Hausa communities in Kano State. *Malaria Journal*, 15, 351. doi: 10.1186/s12936-016-1394-3.

[11] Garba, B., Muhammed, A., Musa, A. et al., 2016, "Diagnosis of malaria: a comparison between microscopy and rapid diagnostic test among under five children at Gusau, Nigeria." *Sub—Saharan Africa Journal of Medicine*, 3, 96–101. doi: 10.4103/2384-5147.184371.

[12] Garba D. D., Ameh J. B., Whong, C. M. Z. and Aminu-Mukhtar M, 2016, Prevalence of malaria parasites among blood donors in Kaduna, Nigeria. *International Journal of Research in Medical Sciences*, 4(6), 2112-2119. https://doi.org/10.18203/2320-6012.ijrms20161770.

[13] Griffin, J. T., Hollingsworth, T. D., Okell, L. C., Churcher, T. S., White, M., Hinsley, W., Bousema, T., Drakeley, C. J., Ferguson, N. M., Basáñez, M., Ghani, A. C., 2010, Reducing Plasmodium falciparum malaria transmission in Africa: a model-based evaluation of intervention strategies. *PLoS Medicine*, 7(8). Retrieved from: https://doi.org/10.1371/journal.pmed.1000324.

[14] Khanam, S., 2017, Prevalence and Epidemiology of Malaria in Nigeria: A Review. *International Journal of Research in Pharmacy and Biosciences*, 4*(8)*, 10-12. ISSN 2394-5885 (Print) & ISSN 2394-5893 (Online). Retrieved from: http://www.ijrpb.org/papers/v4-i8/2.pdf.

[15] Megnekou, R., Djontu, J. C., Nana, B. C., Bigoga, J. D., Fotso, M., Fogang, B., and Leke, R. F. G., 2018, Accuracy of One Step malaria rapid diagnostic test (RDT) in detecting Plasmodium falciparum placental malaria infection in women living in Younde, Cameroon. *Malaria Journal*, 17, 450. https://doi.org/10.1186/s12936-018-2595-8.

[16] National Malaria Elimination Programme. https://nmcp.gov.ng/about-national-malaria-elimination-programme/. Accessed September 05, 2020.

[17] Nigeria Malaria Fact Sheet, 2011. https://photos.state.gov/libraries/nigeria/231771/Public/December-MalariaFactSheet2.pdf. Accessed, September 15, 2020.

[18] Nzeako, S. O., Nduka, F. O. and Origie, O. A., 2013, "Prevalence of malaria in pregnant women attending antenatal care at University of Port Harcourt Primary Healthcare Centre Aluu, Port Harcourt, Rivers State, Nigeria." *International Journal of Scientific Research in Environmental Sciences*, 1(10), 268–272. http://dx.doi.org/10.12983/ijsres-2013-p268-272. Available online at http://www.ijsrpub.com/ijsres.

[19] Okangba, C, Elikwu, C., Shobowale, E., Shonekan, O. and Nwadike, V., 2016, "Histidine rich protein 2 performance in determining the prevalence of malaria among patients presenting with clinical symptoms of malaria." *Scientific Journal of Pure and Applied Sciences*, 5(1), 339–350.

[20] Seiyaboh, E. I., Inyang, I. R. and Izah, S. C., 2016, Seasonal Variation of Physico-Chemical Quality of Sediment from Ikoli Creek, Niger Delta. *International Journal of Innovative Environmental Studies Research*, 4*(4)*, 29-34.

[21] Udoh, E., Ita, A., Odey, F et al., 2013, "Malariometric indices among Nigerian children in a rural setting," *Malaria Research and Treatment*, 4. http://dx.doi.org/10.1155/2013/716805.

[22] Uneke, C. J., Ogbu, O. and Nwojiji, V., 2006, "Potential risk of induced malaria by blood transfusion in South-eastern Nigeria." *McGill Journal of Medicine,* 9(1), 8–13. PMCID: PMC2687905; PMID: 19529802. Retreived from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2687905/pdf/mjm9_1p8.pdf.

[23] Ugah, U. I., Alo, M. N., Owolabi, J. O., Okata-Nwali, O. D., Ekejindu, I. M., Ibeh, N., Elom, M. O., 2017, Evaluation of the utility value of three diagnostic methods in the detection of malaria parasites in endemic area. *Malaria Journal*, 16, 189, Retrieved from: https://doi.org/10.1186/s12936-017-1838-4.

[24] World Bank, 2019, The World Bank in Nigeria: Overview. https://www.worldbank.org/en/country/nigeria/overview.

[25] World Health Organization, 2016, Nigeria launches the 2015 National Malaria Indicator Survey. https://www.afro.who.int/news/nigeria-launches-2015-national-malaria-indicator-survey.

[26] World Health Organization Malaria Report, 2017, Global response to malaria at crossroads. http://www.who.int/mediacentre/news/releases/2017/malaria-report-response/en/.

[27] World Health Organization, 2018, World Malaria Day 2018; Ready to Beat Malaria. https://www.afro.who.int/news/world-malaria-day-2018-ready-beat-malaria.

[28] World Health Organization, 2019, "The World Malaria Report 2019" at a glance. https://www.who.int/news-room/feature-stories/detail/world-malaria-report-2019.

[29] World Health Organization, 2019, Malaria control: Households receive over eight million nets in Kano. https://www.afro.who.int/news/malaria-control-households-receive-over-eight-million-nets-kano.

[30] Wogu, N. & Nduka, F. O., 2017, Evaluating Malaria Prevalence Using Clinical Diagnosis Compared with Microscopy and Rapid Diagnostic Tests in a Tertiary Healthcare Facility in Rivers State, Nigeria. *Journal of Tropical Medicine,* 2018. https://doi.org/10.1155/2018/3954717.

[31] Wongsrichanalai, C., Barcus, M. J., Muth, S., Sutamihardja, A., Wernsdorfer, W. H., 2007, A review of malaria diagnostic tools: microscopy and rapid diagnostic test (RDT). American Journal of Tropical Medicine and Hygiene, 77(6), 119–127. https://www.ncbi.nlm.nih.gov/pubmed/18165483.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art011

Assessment of Knowledge of Essential Supply Chain Functions among HIV/AIDS Supply Chain Workforce in Nigeria

Sunday O Aguora[1]*, Azuka C Oparah[2], Edith C Okechukwu[3]
[1, 3]*School of Public Health, Texila American University, Georgetown, Guyana, South America*
[2]*Department of Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, Nigeria*
**Corresponding Author: sunnyaguora@yahoo.com[1]*

Abstract

This study on assessment of knowledge of essential supply chain functions among HIV/AIDS supply chain workforce in Nigeria comprised of research objectives, questions and hypothesis. A pre-tested self-completed structured questionnaire (422) was administered to respondents, 396 were completed and returned, with a response rate of (93.8%). The respondents had received previous trainings and knowledge distribution of essential supply chain functions showed good knowledge in serving customers (84.8%), procurement (82.6%), logistics management information system (78.8%), monitoring and evaluation (77.5%) and product selection (71.0%)) and capacity gaps in inventory strategy (48.7%), warehouse and distribution (48.0%), quantification (44.2%) and risk management (33.3%). The study revealed knowledge gaps in essential supply chain functions such as inventory strategy, warehouse and distribution, quantification and risk management among HIV/AIDS supply chain workforce. A reliability analysis was carried out on knowledge level of essential supply chain functions, Cronbach's alpha showed the questionnaire to reach acceptable reliability, $\alpha = 0.925$. Chi-square statistic revealed that knowledge of essential supply chain functions is a significant factor of HIV/AIDS supply chain workforce capacity ($p<0.05$). There is need to strengthen HIV/AIDS workforce capacity in the areas they are deficient to ensure effective provision of service and improved health outcomes.

Keywords: *HIV/AIDS, supply chain workforce, knowledge, supply chain functions.*

Introduction

Human resources have been noted as the most important part of a functional health system (WHO, 2000), and development of skilled workforce contributes to health systems strengthening (Schneider *et al*., 2011). Health systems strengthening (HSS) is vital to achieving health-related Sustainable Development Goals (SDGs) and improved health outcomes (Leatherman *et al*., 2010; Frenk, 2010; Fowkes *et al*., 2016). There is a growing concern that without urgent improvements in the performance of health systems, the health-related Sustainable Development Goals will not be achieved because of lack of skilled human resources for health. It follows therefore that health systems that function well usually are staffed with adequate human resources possessing the right skills and motivation. Thus, the need for a well-trained and competent workforce, knowledgeable on essential supply chain functions to be engaged in HIV/AIDS supply chain management. Human resources are recognized as a key performance driver within supply chains (Brown and Sankaranarayanan, 2014). Therefore, skilled workforce is essential for sustained progress in HIV/AIDS supply chain management in Nigeria. It is important to ensure existing workforce are well trained and given adequate mix of skills. The supply chain workforces are true lifesavers and improving the quality of HIV/AIDS supply chain workforce is vital. To ensure sustainable supply chain, a network of supply chain professionals with broad and vastly specialized expertise needs to be developed (Brown and Sankaranarayanan, 2014). Every cadre of supply chain workforce at every step till the last mile of the supply chain should be adequately trained such that only experts would deliver their task in a professional manner (UNICEF, 2014). Workforce knowledge is key for sustained progress in health supply chains and sustainable development (Brown and Sankaranarayanan, 2014).

Therefore, the present study seeks to assess knowledge of essential supply chain functions among HIV/AIDS supply chain workforce in Nigeria.

Materials and Methods

Selection of the area

The study was carried out in Abuja, the administrative and political centre of Nigeria. Abuja is the centre for policy development, coordination and monitoring of implementation of HIV/AIDS supply chain activities. It has boundary with four states; Kaduna state (north), Niger state (west), Nassarawa state (east) and Kogi state (south) (Ebele *et al*., 2014). Abuja also serves as headquarter of many of the HIV/AIDS organizations from where they carry out their HIV/AIDS supply chain functions around the country.

Sample size determination

Cochran's formula ($n_0 = z^2pq/e^2$) for calculating representative sample size for infinite population was used (Cochran, 1977).

n_0 = sample size

z = 1.96 (selected critical value of desired confidence level)

p = 0.5 (assuming the maximum variability, which is equal to 50%)

q = 1- p

e = 0.05 (±5% desired level of precision at 95% confidence level)

$n_0 = (1.96)^2(0.5)\ (0.5)/\ (0.05)^2$

$n_0 = 384.16$

To ensure minimum response rate, 10% overage was added to the calculated sample size to accommodate possible drop out, non-response, incomplete response and late response.

Sampling technique

Respondents (422) from public sector, private sector, non-governmental organization, faith-based organization and donor agency involved in HIV/AIDS supply chain management without gender discrimination were selected using random sampling technique. The study excluded those who had not spent up to two years in their respective organizations and obtained at least bachelor's degree qualification.

Data collection

Primary and secondary sources of data were used for the study. We used the secondary data for literature review and design of the questionnaire. The secondary data was collected from textbooks, journals and newspapers. The primary sources of data were those collected from the field through a structured self-completed questionnaire. The purpose of the study and questionnaire were explained to the participants and the consent of each participant was obtained before joining the study. Participants were free to withdraw at any point from the study without consequences. The identity of participants was kept anonymous and confidential by excluding their names and organizations in the questionnaire. The questionnaire had twenty-three (23) questions with which relevant information in the area of socio-demographic characteristics, areas of training and knowledge distribution on supply chain functions were obtained. The questionnaire required about 20 minutes to complete. We ensured construct validity by fashioning the questionnaire based on relevant literatures and empirical studies. To ensure content validity, the questionnaire was reviewed by the supervisor and pre-tested and modifications made based on the results of the review and pre-test. The survey was conducted between September and December 2019.

Data analysis

Returned questionnaires were checked for accuracy, completeness and consistency. Usable questionnaires were numbered serially and coded. Each questionnaire was captured on the excel template while ensuring the serial number on the hard copy of the questionnaire ties with the serial number on the excel template. The entries in the excel template were rechecked for accuracy before data analysis. Analysis of data was carried out with Statistical Package for Social Sciences (SPSS Version 20.0) and Chi-square statistic to determine the level of association at 5% level of significance ($p \leq 0.05$).

Results and Discussion

We administered 422 questionnaires, only 396 questionnaires were returned giving a response rate of 93.8%. Table (1) captured socio-demographic characteristics with age of most (96.0%) of the respondents between 30 and 59 years. Most of the respondents (69.4%) were male, with years of experience in HIV/AIDS supply chain between 4 and 15 years and more than half of the respondents had master's degree

as their highest educational qualification. Most of the respondents work at the national and state levels in the NGO and public sector with majority (74.2%) in the rank of manager, supervisor, specialist, advisor and officer. Table (2) captured the areas of previous trainings in supply chain functions, table (3) percentage frequency of knowledge level of supply chain functions, table (4) perception towards supply chain workforce capacity, table (5) Cronbach's alpha test scores and table (6) Chi square test.

The socio-demographic characteristics of the respondents (Table 1) showed that the respondents were drawn from all levels of the health sector with predominant respondents from national and state levels that drive supply chain policy development and implementation. It also entails stakeholders that have played key roles at the different levels and acknowledged supply chain as a key driver for successful HIV/AIDS program implementation. This is essential for development of competent and knowledgeable workforce needed for health supply chain success. The various stakeholders denote diverse perspectives, expertise and capacity to enable consensus, promoting national and local ownership for a sustainable strategy to improve HIV/AIDS supply chain performance. The respondents have substantial experience with good understanding of the supply chain management needs of the HIV/AIDS program, and can be trusted for reliable and valid results, thus guaranteeing credence and quality of the research outcomes. With more than half of the respondents with master's degree as their highest educational qualification it shows that the respondents have attained some level of skill which can be enhanced to promote effective and efficient supply chain functions. They have workable knowledge of good supply chain management. In the present study, the respondents had received training in the key supply chain functions (Table 2). This means that the respondents used in this study have basic background and knowledge required for their position.

The study revealed good knowledge in some supply chain functions (serving customers, product selection, procurement, logistics management information system and monitoring and evaluation) and capacity gaps in risk management, quantification, inventory strategy and warehousing and distribution (Table 3) and use of quantification results to inform procurement of HIV/AIDS products within government system at the national and state levels (Table 4). This finding supports existing body of knowledge; Matowe *et al.* (2008) reported limited skills on quantification, inventory strategy, ordering, receiving, storing and distribution, and TGF (2017) reported that supply chain management remains a significant challenge and interventions by donors (The Global Fund, PEPFAR, USAID, United Nations Agencies etc.) only resulted to improvement in procurement and getting the products into the country but do not address the challenges of quantification and getting the products to the intended beneficiaries. Itiola and Agu (2018) reported that requisite supply chain management skills and competencies are inadequate in the Nigeria public sector, whereas Matowe *et al*. (2008) observed that the weakness of health supply chains has remained a consistent barrier across a range of low- and middle- income countries. Therefore, effective supply chains are vital to deliver essential health commodities (Cometto *et al*., 2014) and weakness of supply chain functions increases the potential for the entry of counterfeit and substandard products (WHO Bulletin, 2010). On the other hand, Dowling (2011) reported that stock outs of essential commodities are common in many low- and middle-income countries, with a mean availability of core medicines in the public sector estimated between 38.2% in sub-Saharan Africa and 57.7 % in Latin America and the Caribbean. As a result of inadequate forecasting and information flow among stakeholder's stock outs of ARV drugs are common among health facilities in west and central Africa (UNICEF *et al*., 2008). A similar situation has been noted in east and southern Africa, where stock outs of ARVs and other life-saving drugs have also been a problem (Thom and Langa, 2010).

Notwithstanding past huge investment over the past decades, national supply chains are often unable to respond effectively to existing demands, putting health outcomes at risk (Brown *et al*., 2014). In a previous study, Waako *et al*. (2009) reported inadequate human resources capacity to select, quantify and distribute ARVs and related commodities as some of the problems in East African countries. Despite PEPFAR efforts to improve the capacity of partner country governments to quantify, forecast, procure,

warehouse, distribute, and track commodities, challenges to assuring consistent and reliable supply chain functioning remain in many countries (IOM, 2013). Reliable supply chain is critical for sustainable and cost-efficient HIV/AIDS responses as well as to avoid disruptions to the care and treatment of people living with HIV/AIDS (IOM, 2013).

Furthermore, this study (Table 4) revealed that skilled workforce is an important part of functional HIV/AIDS system, contributes to health systems strengthening and vital for improving health outcomes and achieving health-related Sustainable Development Goals. The result of this study is consistent with reports of previous studies (WHO, 2000; Leatherman *et al*., 2010; Frenk, 2010; Schneider *et al.*, 2011). It follows that supply chain workforce capacity should be developed to ensure availability of skills to provide quality health services (Matovu *et al*., 2013). Furthermore, for supply chains to run effectively, it requires dynamic workforce (which is the most important resource) at all levels who are motivated and possess the competencies required to fulfill essential supply chain functions.

Similarly, the study showed that there is shortage of manpower at the sub-national level and the country's current poor economic situation may not allow for personnel recruitment in the immediate future (Table 4). Supply chain workforce capacity gaps have been reported in low- and middle-income countries with some having vacancy rates of about 71% for public sector posts that would require accredited pharmaceutical training (WHO, 2011), often due to a combination of insufficient training as well as 100-150% higher wages in the private sector as compared to the public sector (Cometto *et al*., 2014). There is a rising need to address human resources capacity requirements for supply chain systems (Cometto *et al*., 2014) and investments in the health supply chain personnel will be worthwhile and effective strategy to improve the overall efficiency of health systems (Soucat and Scheffler, 2013). More so, workforce crisis due to brain drain poses enormous challenge in meeting the manpower capacity needs in the healthcare sector (Ike, 2007) and may hinder progress towards country ownership and sustainability. While there may be adequate capacity in the private sector, available human resource in the Nigerian public sector is inadequate and do not have requisite supply chain skills and competencies (Itiola and Agu, 2018). It is well-known that the global problem of insufficient and adequately trained human resources for health is most critical in sub-Saharan Africa with alarming health workforce crisis (Anywangwe and Mtonga, 2007). In a previous work, Frenk (2010) reported workforce shortage as the most complex challenges of health systems strengthening. Matovu *et al*. (2011) recognized workforce shortage as significant constraint in achieving the SDGs. Inadequate human resource for health is an important global problem in Sub-Saharan Africa (Anywangwe and Mtonga, 2007). In another study, Adekola and Adelanwa (2014) reported human resource crisis in all areas of the health system and cadres including the HIV/AIDS supply chain workforce in Nigeria.

A number of reasons have been provided for the human resource shortage; chronic underinvestment in human resources (IOM, 2011), frozen recruitment and salaries (IOM, 2011), restricted public budgets (IOM, 2011), higher turnover of health workforce (IOM, 2011), insufficient compensation (Oleribe *et al*., 2016), harsh working conditions (Oleribe *et al*., 2016), high burden of HIV and AIDS (Mazibuko *et al*., 2014), increased numbers of patients needing antiretroviral (ARV) services (Mazibuko *et al*., 2014), migration to developed countries in search of greener pastures (Waako *et al*., 2009; Itiola and Agu, 2018), higher salaries within externally funded projects, sometimes more than twice as obtained in the public sector (Windisch *et al*., 2011), motivation (Akinyemi and Atilola, 2013) and uneven distribution of health workers (Bangdiwala *et al*., 2010; Adeloye *et al*., 2017).

The problem of human resources skills weakness in supply chain management in Nigeria needs to be addressed to ensure country's progress towards sustainability. This is even more imperative now with the declining donor funding. PEPFAR's contribution to health workforces in partner countries has been directed to more pre-service production. However, partner countries continue to have huge need for health workforce development and retention (IOM, 2013). Therefore, adherence by partner countries to the Global Code of Practice on the International Recruitment of Health Personnel and follow through on commitments to the Abuja Declaration could support both sustainability of

their own health workforces and country ownership (OAU, 2001; IOM, 2013).

A reliability analysis (Table 5) was carried out on the knowledge level of essential supply chain functions scale comprising 9 items. Cronbach's alpha showed the questionnaire is reliable, $\alpha = 0.925$. Chi-square (χ^2) test (Table 6) revealed a relationship between knowledge of essential supply chain functions and HIV/AIDS supply chain workforce capacity ($p<0.05$). We accepted the alternative hypothesis (Ha), therefore knowledge of essential supply chain functions is a significant factor of HIV/AIDS supply chain workforce capacity.

Table 1. Socio-demographic Characteristics of Respondents

Socio-demographic Characteristics	**Categorization**	**Number (%)**
Age (Years)	20-29	0 (0.0)
	30-39	121 (30.6)
	40-49	207 (52.3)
	50-59	52 (13.1)
	≥60	16 (4.0)
	Total	396 (100.0)
Gender	Female	121 (30.6)
	Male	275 (69.4)
	Total	396 (100.0)
Years of Experience (years)	0-3	34 (8.6)
	4-7	104 (26.3)
	8-11	138 (34.8)
	12-15	103 (26.0)
	≥16	17 (4.3)
	Total	396 (100.0)
Sector of Engagement	Public	103 (26.0)
	Private	52 (13.1)
	Faith-based organization	17 (4.3)
	NGO	207 (52.3)
	Donor Agency	17 (4.3)
	Total	396 (100.0)
Job Title	Director	68 (17.2)
	Associate/Assistant Director	34 (8.6)
	Manager/Supervisor	156 (39.4)
	Specialist/Advisor/Officer	138 (34.8)
	Total	396 (100.0)
Level of Supply Chain Work	Health Facility	20 (5.1)
	LGA	52 (13.1)
	State	138 (34.8)
	National	175 (44.2)
	International	11 (2.8)
	Total	396 (100.0)
Educational Qualification	Bachelor's Degree	119 (30.1)
	Postgraduate Diploma	14 (3.5)
	Fellowship	35 (8.8)
	Master's Degree	221 (55.8)
	Doctorate	7 (1.8)
	Total	396 (100.0)

Table 2. Respondents Areas of Training and Experience in Supply Chain Management

Variables	Yes (%)	No (%)
Serving Customers	207 (52.3)	189 (47.7)
Product Selection	207 (52.3)	189 (47.7)
Quantification	207 (52.3)	189 (47.7)
Procurement	258 (65.2)	138 (34.8)
Inventory Strategy	258 (65.2)	138 (34.8)
Warehousing and Distribution	241 (60.9)	155 (39.1)
Logistics Management Information System (LMIS)	258 (65.2)	138 (34.8)
Monitoring and Evaluation	207 (52.3)	189 (47.7)
Risk Management	155 (39.1)	241 (60.9)

Table 3. Percentage Frequency of Knowledge Level of Supply Chain Functions

Items	Positive Responses Frequency N (%)
Nigeria HIV/AIDS supply chain workforce has demonstrated capacity in the key supply chain functions	
Serving Customers	336 (84.8)
Product Selection	281 (71.0)
Quantification	175 (44.2)
Procurement	327 (82.6)
Inventory Strategy	193 (48.7)
Warehousing and Distribution	190 (48.0)
Logistics Management Information System (LMIS)	312 (78.8)
Monitoring and Evaluation	307 (77.5)
Risk Management	132 (33.3)

Positive responses = Agree/ Strongly Agree

Table 4. Percentage Frequency of Respondents Perception towards Supply Chain Workforce Capacity

Items	Positive Responses Frequency N (%)
Development of skilled workforce contributes to health systems strengthening	396 (100)
Supply chain workforce is an important part of functional HIV/AIDS system	396 (100)
Skilled supply chain workforce is vital for improving health outcomes and achieving health-related Millennium Development Goals	396 (100)
There is shortage of manpower at the sub-national level and the country's current poor economic situation may not allow for personnel recruitment in the immediate future	344 (86.9)
There are still capacity gaps at the national and state levels especially for quantification and use of quantification results to inform procurement of HIV/AIDS products within Government system	379 (95.7)
Inadequate workforce is the most important problem of Nigeria HIV/AIDS supply chain	241 (60.9)

Positive responses = Agree/ Strongly Agree

Table 5. Cronbach's Alpha Test on Knowledge Level of Supply Chain Functions

Items	Mean	SD	Factor Loading	Cronbach's Alpha
Nigeria HIV/AIDS supply chain workforce has demonstrated capacity in the key supply chain functions				**0.925**
Serving Customers	3.876	0.8493	0.891	
Product Selection	3.576	1.1722	0.846	

Quantification	3.005	1.0626	0.759	
Procurement	3.745	0.7912	0.786	
Inventory Strategy	2.965	1.1600	0.777	
Warehousing and Distribution	3.104	1.2855	0.802	
Logistics Management Information System (LMIS)	3.662	0.9608	0.869	
Monitoring and Evaluation	3.699	0.7484	0.671	
Risk Management	2.914	1.0226	0.775	
Mean of mean± SD	3.394	1.006		

Table 6. Relationship between Knowledge of Supply Chain Functions and Supply Chain Workforce Capacity

Knowledge of Supply Chain Functions	**Factors of Supply Chain Workforce Capacity**		**Total**	χ^2	**p-value**
	High Level Factors (%)	**Low Level Factors (%)**			
High Knowledge	281 (93.1)	21 (6.9)	302 (100.0%)	207	0.001
Low Knowledge	19 (20.2)	75 (79.8)	94 (100.0%)		

Null Hypothesis (Ho): Knowledge level of supply chain functions is not a significant factor of supply chain workforce capacity.

Alternative Hypothesis (H_a): Knowledge level of supply chain functions is a significant factor of supply chain workforce capacity.

Conclusion

The study revealed lack of capacity in essential supply chain functions (e.g. warehouse and distribution, inventory strategy, quantification, and risk management) among HIV/AIDS supply chain workforce in Nigeria to provide quality HIV/AIDS prevention, care and treatment services. This may posse threat to effectively plan for HIV/AIDS service delivery and sustainability of the national HIV/AIDS response.

Recommendations

Federal and State Ministries of Health should adopt a mix of effective human resources capacity building approaches to proactively increase knowledge and skills of the supply chain workforce particularly in the observed areas of deficiency e.g. warehouse and distribution, inventory strategy, quantification and risk management to ensure availability of well-prepared, skilled and knowledgeable workforce vital for well-functioning HIV/AIDS supply chain and quality services.

References

[1] Adekola, A. and Adelanwa, A. (2014). Developing the SCM workforce in Nigeria through contextualised preservice education and continued professional development. *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1): O22.

[2] Adeloye, D., David, R. A., Olaogun, A. A., Auta, A., Adesokan, A., Gadanya, M., Opele, J. K., Owagbemi, O., and Iseolorunkanmi, A. (2017). Health workforce and governance: the crisis in Nigeria, *Human Resources for Health*, 15:32 DOI 10.1186/s12960-017-0205-4.

[3] Akinyemi, O. and Atilola, O. (2013). Nigerian resident doctors on strike: insights from and policy implications of job satisfaction among resident doctors in a Nigerian teaching hospital. *Int J Health Plann Manage*, 28(1): e46–61.

[4] Anywangwe, S. C. E. and Mtonga, C. (2007). Inequities in the global health workforce: the greatest impediment to health in sub-Saharan Africa. *Int J Environ Res Public Health*, 4:93-100.

[5] Bangdiwala, S. I., Fonn, S., Okoye, O. and Tollman, S. (2010). Workforce resources for health in developing countries. *Public Health Rev*., 32(1):296–318.

[6] Brown, A. and Sankaranarayanan, A. (2014). *Human Resource Development in Supply Chain Management of Health Commodities - A realist review of UN sources*, ISBN: ISBN: 978-1-74088-410-5. 10.13140/RG.2.1.2365.1046.

[7] Brown, A., Atif, M., Hasselberg, E., Steele, P., Wright, C., and Babar, Z. (2014). Human resources health supply chains and access to essential medicines. *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1):2.

[8] Cochran, W.G. (1977). *Sampling Techniques*. 3rd Edition, John Wiley & Sons, New York.

[9] Cometto, G., Babar, Z., Brown, A., Hedman, L. and Campbell, J. (2014). Health supply chain personnel: an integral part of the health workforce." *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1): I1.

[10] Dowling P. (2011). *Healthcare Supply Chains in Developing Countries: Situational Analysis*. Arlington, Va.: USAID | DELIVER PROJECT.

[11] Ebele, F.U., Aregbosola, B.G., Hasstrup, D.T. and Adams, E. (2014). The Effect of Climate Change on Agricultural Production among Farmers in Kwali Area Council of Federal Capital Territory of Nigeria. *Advances in Social Sciences Research Journal*, 1(2):13-26.

[12] Fowkes, F. J. I., Draper, B. I., Hellard, M. and Stoové, M. (2016). Achieving development goals for HIV, tuberculosis and malaria in sub-Saharan Africa through integrated antenatal care: barriers and challenges, *BMC Medicine*, 14:202 DOI 10.1186/s12916-016-0753-9.

[13] Frenk, J. (2010). The Global Health System: Strengthening National Health Systems as the Next Step for Global Progress. *PLoS Med*, 7(1): e1000089. doi: 10.1371/journal.pmed.1000089.

[14] Ike, S. O. (2007). The health workforce crisis: the brain drain scourge. *Niger J Med*., 16:204–211.

[15] IOM (Institute of Medicine). (2011). *Preparing for the Future of HIV/ AIDS in Africa: A Shared Responsibility*. Washington, DC: The National Academies Press.

[16] IOM (Institute of Medicine). (2013). *Evaluation of PEPFAR*. Washington, DC: The National Academies Press.

[17] Itiola, A. J., and Agu, K. A. (2018). Country ownership and sustainability of Nigeria's HIV/AIDS Supply Chain System: qualitative perceptions of progress, challenges and prospects. *Journal of Pharmaceutical Policy and Practice*, 11:21 https://doi.org/10.1186/s40545-018-0148-8.

[18] Leatherman, S., Ferris, T. G., Berwick, D., Omaswa, F. and Crisp, N. (2010). The role of quality improvement in strengthening health systems in developing countries. *Int J Qual Health Care*, 22(4): 237–243

[19] Matovu, J. K. B., Rhoda, K., Wanyenze, Susan Mawemuko, Gakenia Wamuyu-Maina, William Bazeyo, Olico-Okui and David Serwadda. (2011). Building capacity for HIV/AIDS program leadership and management in Uganda through mentored Fellowships. *Glob Health Action*, 4:5815. doi:10.3402/gha.v4i0.5815.

[20] Matovu, J. K. B., Rhoda, K., Wanyenze, Susan Mawemuko, Olico Okui, William Bazeyo and David Serwadda (2013). Strengthening health workforce capacity through work-based training; *BMC International Health and Human Rights*, 13:8.

[21] Matowe, L., Waako, P., Odoi-adome, R., Kibwage, I., Minzi, O. and Bienvenu, E. (2008). A strategy to improve skills in pharmaceutical supply management in East Africa: the regional technical resource collaboration for pharmaceutical management. *Human Resources for Health*, 6:30. doi:10.1186/1478-4491-6-30.

[22] Mazibuko, G. N., Sagwa, E., Kagoya, H. R., Kibuule, D., Rennie, T., Mavere, T., Ghoneim, R., Mabirizi, D., Naikaku, E., Niaz, Q. and Lates, J. (2014). Incorporating pharmaceutical supply management modules in the preservice curriculum of the BPharm program, of the University of Namibia, School of Pharmacy, *Journal of Pharmaceutical Policy and Practice*, 7(Suppl 1): P12.

[23] OAU (Organization of African Unity). (2001). Abuja Declaration on HIV/AIDS, tuberculosis and other related infectious diseases. Presented at African Summit on HIV/AIDS, Tuberculosis and Other Related Infectious Diseases, Abuja, Nigeria.

[24] Oleribe, O. O., Ezieme, I. P., Oladipo, O., Akinola, E. P., Udofia, D., Taylor-Robinson, S. D. (2016). Industrial action by healthcare workers in Nigeria in 2013-2015: an inquiry into causes, consequences and control-a cross-sectional descriptive study. *Hum Resour Health*, 14(1):46. doi: 10.1186/s12960-016-0142-7.

[25] Schneider, D., Evering-Watley, M., Walke, H., Bloland, P. B. (2011). Training the Global Public Health Workforce through Applied Epidemiology Training Programs: CDC's Experience, 1951–2011. *Public Health Rev*, 33:190–203.

[26] Soucat A, and Scheffler R. (2013). *The Labor Market for Health Workers in Africa: New Look at the Crisis*. Washington, DC: World Bank.

[27] TGF (The Global Fund). (2017). *Audit Report: The Global Fund's In-country Supply Chain Processes*, GF-OIG-17-008 Geneva, Switzerland.

[28] Thom, A., and Langa, L. (2010). South Africa: Provinces face drug stock outs due to overspending. *The Pharma Letter*, Putney London SW151SP. http://allafrica.com/stories/201004090010.html (accessed October 29, 2019).

[29] UNICEF, WHO, and ESTHER. (2008). *Evaluation of ARV procurement and supply management systems in west and central Africa region*. Dakar, Senegal.

[30] UNICEF. (2014). *Supply Annual Report 2013*. UNICEF Supply Division, Copenhagen, Denmark.

[31] Waako, P., Odoi, R.., Obua, C., Owino, E., Tumwikirize, W., Ogwal-Okeng, J., Anokbonggo, W., Matowe, L., and Aupont, O. (2009). Existing capacity to manage pharmaceuticals and related commodities in East Africa: An assessment with specific reference to antiretroviral therapy, *Human Resources for Health* 7(1):21 DOI: 10.1186/1478-4491-7-21.

[32] WHO. (2000). *World Health Report 2000 Health systems: improving performance.* Geneva, Switzerland.

[33] WHO. (2010). Growing threat from counterfeit medicines. *Bulletin*, 88(4):241-320.

[34] WHO. (2011). *Tackling the crisis of workforce shortages in the pharmaceutical sector*. Geneva, Switzerland.

[35] Windisch, R., Waiswa, P., Neuhann, F., Scheibe, F. and Savigny, D. (2011). Scaling up antiretroviral therapy in Uganda: using supply chain management to appraise health systems strengthening. *Globalization and Health*, 7:25.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art012

Assessment of Practices and Awareness of Safety Measures of Biomedical Wastes Management among Health Workers in Metropolitan Hospitals in Abuja, Nigeria

Edith C Okechukwu[1]*, Azuka C Oparah[2], Sunday O Aguora[3]
[1, 3]School of Public Health, Texila American University, Georgetown, Guyana, South America
[2]Department of Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, Nigeria
**Corresponding Author: ecokechukwu@gmail.com[1]*

Abstract

Effective and efficient biomedical wastes management is vital in the health care delivery system. Safe environment and public health could possibly be achieved through the standard practices of biomedical wastes procedures with safety measures in place. The aim of this study is to evaluate the practices and awareness of safety measures among health workers towards biomedical wastes management in selected hospitals in Abuja, Nigeria. Data were collected by structured questionnaire and on- the-spot observation. Three private and three public hospitals that provides health care services in Abuja were surveyed. Descriptive and inferential statistical analysis were used in the analysis of the data. Chi-square (χ^2) test was used to determine the level of significance set at $p \leq 0.05$. The male health workers were 220 (55.00%) and the female were 180 (45.00%) in the survey. The Nurses were the highest respondents in the study with percentage frequency of 117(28.75%) followed by the Laboratory Scientists 96 (24.00%), Pharmacists 71 (17.75%), Doctors 64(16.00%) and other health care workers 54 (13.50%). The practices of handling biomedical waste among health workers is a significant factor of biomedical wastes management ($p<0.05$). Also, the awareness on safety measures among health workers is a significant factor of biomedical wastes management ($p<0.05$). The study revealed that there are gaps in the standard practices of handling biomedical wastes such as transportation from point of generation, treatment, temporal storage and disposal, whereas awareness of safety measures and practices is appreciable. Training of health workers on standard practices of handling biomedical wastes is crucial in achieving efficient biomedical wastes management in the hospitals. Government should be involved in the policy making and ensure the enforcement of strict compliance in accordance with WHO stipulations.

Keywords*: Safety measures, environment, public health, biomedical wastes, health workers.*

Introduction

The proliferation of hospitals mostly in the urbanized locations in Nigeria, population surge and use of hospitals (Chima *et al*., 2011; Chima *et al*., 2014; Useh *et al*., 2018), largely contributes to the total wastes stream of various categories that could become a daunting task for handling, storage, treatment and disposal of biomedical wastes.

In developing nations, poor management of biomedical wastes is usually encountered which are attributable to lack of awareness on the public health implication, non-participation of government and ineffective legislation (Derres *et al*., 2018). This suggests improper handling of waste during generation, collection, inappropriate storage methods, treatment, transport, lack of personal protective equipment, untrained personnel and unsafe disposal options (Chima *et al*., 2014).

Effective and efficient biomedical wastes management should be paramount in any functional health care delivery system. The World Health Organization have designed a biomedical waste management guideline to ensure safe management of these wastes generated from health care activities (Derres *et al*., 2018). Vital steps are involved in the appropriate biomedical wastes management process which are listed as follows: segregation, transportation, treatment, storage, disposal

including minimization and reuse (Rao *et al*., 2004). The process can involve a number of intermediary stages (Ola-Adiza *et al*., 2015).

The belief that it is the sole responsibility of the government to manage biomedical and general wastes has made waste generators (health workers) to neglect their primary duty of proper handling of biomedical wastes and barely think of the adverse effects of improper biomedical wastes management. The international policy states that the generator of waste is responsible for the proper handling, treatment and disposal of wastes and has only been theoretical (Ngwuluka *et al*., 2009). Obviously, there exist a missing link among the policymakers, regulators and health care establishments on establishing laws, enforcement and implementation of effective and efficient biochemical wastes management in the health care institutions. Comparative information on the practices of handling and awareness of safety measures of biomedical wastes management are scanty especially in hospitals located in the urban areas in Nigeria. Hence, the aim of the study is to assess the practices of handling and awareness on safety measures of biomedical wastes management among health workers in public and private hospitals in Abuja.

Materials and Methods

Selection of the area

The study was carried out in Abuja the Federal Capital Territory of Nigeria. Abuja is divided into six Area Councils of which Abuja Municipal Area Council, a densely populated area because of the administrative seat of government and commercial activities. According to United Nation Fund for Population Activities, UNFPA (2015), Federal Capital Territory is estimated to have a population of 3,324,000 people. The municipal has many private and public (district) hospitals to serve the increasing population.

Sample size determination

The researcher used Cochran's formula ($n_0=z^2pq/e^2$) for calculating sample size when the population is infinite (Glenn, 1992).

Where:

n_0 = sample size

z = selected critical value of desired confidence level

p = estimated proportion of an attribute that is present in the population

q = 1- p

e = desired level of precision taking 95% confidence level with ±5% precision, the calculation for required sample size was calculated as follows:

p = 0.5; hence q =1-0.5 = 0.5; e = 0.05; z =1.96

$n_0 = z^2pq/e^2$

$n_0 = (1.96)^2(0.5)\ (0.5)/\ (0.05)^2$

n_0 = 384.16

Therefore; n_0 = 384 (minimum sample size for this study)

An overage of (12%) of 384 was added to the sample size to offset for the reasons of non-response, incomplete response and late response in order to have the acceptable minimum response size for the study.

Sampling technique

Six (6) hospitals were selected for the study, using random sampling method. The hospitals were stratified into two groups; private and public based on the ownership and management of the hospitals and were lettered alphabetically to ensure anonymity and confidentiality.

Data collection

Structured self-administered and self-completed questionnaires were used to collect the data. Consent forms were filled by the participants to obtain their consent to participate in the study. Participation was voluntary and participants were free to withdraw at any time. Confidentiality was assured by excluding all the names of the hospital surveyed and respondents.

Data analysis

Statistical Package for Social Sciences (SPSS version 20.0) was used for the analysis of the data. Chi-Square statistical test of significance was used to determine the level of significance of association. Level of significance difference was set at $p \leq 0.05$.

Results and Discussion

Table 1 shows the socio-demographic factors of the health workers across the six metropolitan hospitals in Abuja. The male health workers were 220 (55.00%) and the female were 180 (45.00%). The Nurses were the highest respondents with percentage frequency of 117 (28.75%) followed by the Laboratory Scientists 96 (24.00%), Pharmacists 71 (17.75%), Doctors 64 (16.00%) and other health care workers 54 (13.50%). The result of the study is similar to the reports of

Deress *et al*. (2018) in Ethiopia, Imam *et al*. (2019) in Kano, Nigeria though confined to surgical theatres as the male respondents and nurses were predominant. The Nurses are one of the indispensable health professionals in the health care institutions and are basically involved in most of the generation and segregation of health care wastes. Contrastingly, Awodele *et al*. (2016) in Lagos reported that the majority were domestic workers followed by Nurses and female respondents. The variation in the health professionals could be attributed to method of sampling techniques, location of the health facility and availability of the health professionals during the study.

The practices of handling biomedical wastes as shown in Table 2, the result showed that all the respondents agreed that proper biomedical wastes treatment leads to a reduction in volume of infectious wastes and reduces the risk of transmission of diseases, that treatment of biomedical wastes enhances the safe transportation of biomedical wastes to the disposal site and minimizes transmission of diseases. Almost all the respondents agreed that the practices of segregation of infectious wastes at the source of generation is prime indicator to achieving a sound biomedical wastes management. Over half of the total respondents agreed that intensive training and retraining of health workers on the effective waste management activities are performed. Previous studies showed an increased awareness and knowledge of segregation (Chima *et al*., 2014; Awodele *et al*., 2016; Uchechukwu *et al*., 2017). The finding in the study is consistent with the study conducted in selected health care establishments at Lagos and Abuja that revealed majority of health workers especially in Lagos have received training, segregation is practiced in both locations but treatment of biomedical wastes is still lacking in both locations (Dunloye *et al*., 2018). On the other hand, the findings in the study differs from Ola- Adisa *et al*. (2015) that reported in a study carried out in 30 health care establishments in Jos North, Plateau state showed that the practice of segregation was poor among the health workers, majority of the health workers were barely trained and disposal of biomedical wastes were unprotected and obsolete methods such as burial and incineration were practised. Another study conducted in hospitals in India, revealed unsatisfactory segregation practices, health workers lacked the awareness, training and poor treatment of biomedical wastes in hospitals (Rhada *et al*., 2009). Lack of biomedical wastes management policies in hospital and unpreparedness to tackle the issues could be attributable to the lack of awareness on proper practices of biomedical wastes management.

The Standard Operating Procedure designed for biomedical wastes management process is shown in Table 3. Over three quarter of the respondents agreed to practicing standard operating procedure (SOP) designed for segregation in the hospital. Over half of the respondents agreed to practicing standard operating procedure (SOP) designed for storage in the hospital. The finding in the study revealed that the respondents had the understanding of identification and separation of the different types of biomedical wastes which reflected in the practices of segregation. All the hospitals surveyed practiced segregation of sharps, as the sharps were mostly segregated into sharp boxes and most especially the public hospitals made efforts to use colour coded bins, containers or liners. This is in conformity with the findings of Awodele *et al*. (2016) in Lagos, where majority of the respondents' practised segregation using colour-code. This shows that the health workers have realized the importance of segregation in the management of biomedical wastes. The awareness and availability of SOP guidelines and posters at the various service areas in the hospitals such as diagnostic laboratories, in-patients' wards, operating theatres and pharmacy could attribute to the high level of compliance to the segregation practices in the hospitals as observed.

Segregation is carried out at the point of generation but later mixed with general wastes during collection for final disposal (Debere *et al*.,2013; Yelebe *et al*., 2015) in (Ethiopia and Nigeria) respectively. Udofia *et al*. (2015) reported that about (53.00%) of studies revealed that segregation was practised, only (18.00%) of the studies showed compliance to the use of colour coded bins. Although in some instances black nylon bags were used to collect and store medical wastes, which could cause blind mix up of infectious and non-infectious wastes.

The result showed that over three-quarter of the health workers practised the standard operating procedure of segregation, disposal, labelling and treatment. The result of the study

revealed that in most of the hospitals biomedical wastes were mostly carried manually by the cleaners and hospital attendants to the temporary storage sites as trolleys were occasionally used. This is consistent with the reports of Abah and Ohimain (2011), Muluken *et al*. (2013) where medical wastes receptacles were manually lifted by hospital cleaners, wastes handlers and auxiliary staff.

Though over half of the total respondents showed the practice of standard storage procedure but the observation further revealed that the temporary storage/disposal sites were in an open space not secured and unprotected areas from neither the sun nor rain. This is in conformity with the report of (Ndiaye *et al*., 2012).

The wastes are found tied in bags dumped in the metal bins and most times the bins are filled to the brim such that the wastes drop and litter around the disposal site. This indicates that the wastes are not promptly lifted away for final disposal. The delay of the disposal from the hospital premises could pose environmental risk such as air pollution and presence of disease transmitting rodents. The distance of the temporary storage site is less than 10m from the busy side of the hospital which could portend health risks to humans. This finding is comparable with the study carried out in Owerri, where temporary disposal site was not more than 10m from the hospital facilities (Chima *et al*., 2014).

Table 4, shows the methods of biomedical waste treatment to ensure safe disposal. The result of the study showed that all the respondents were aware and practised disinfection, well over half of the respondents agreed to the practice of autoclaving as a biomedical wastes treatment before disposal. About three-quarter of the respondents did not practise microwaving and shredding. The result shows that the majority of the respondents practised chemical disinfection of some categories of infectious wastes generated from diagnostic laboratories and operating theatres. Over half of the total respondents practised autoclaving especially of medical wastes generated from the diagnostic laboratories prior to the temporary disposal. The treated medical wastes by these methods could ensure safe transportation of medical wastes from point of generation to the disposal sites. Majority of the respondents do not have adequate knowledge nor practise the method of microwaving and shredding. Abah and Ohimain (2011) reported that autoclaving was practised in the hospitals surveyed. Chima *et al*. (2015) reported that about half of the respondents practised chemical disinfection. Contrastingly, commonly used methods of treatment for medical wastes in developed countries are steam sterilization, autoclaving and incineration with air pollution control equipment (APC) (Patwary *et al*., 2011).

The disposal procedures of biomedical wastes in hospitals is shown in Table 5. The result of the study showed that over three-quarter of the total respondents agreed to burning pit and incineration practices and less than a quarter of the total respondents agreed to landfill and recycling disposal method. Furthermore, the results showed that most biomedical wastes are transported occasionally in closed compaction vehicles to designated burning pits. The incineration method employed in hospitals were dysfunctional without air pollution control (APC) equipment (Udofia *et al*., 2015). The finding in the study is similar to the reports of Chima *et al*. (2015) where over three-quarter of the respondents were aware of the methods of burning pits. The finding in the study is consistent with the reports by Abah and Ohimain (2011), Uchechukwu *et al*. (2017) and Denloye *et al*. (2018) where most health care facilities in Nigeria practise open dumpsite and periodical burning of biomedical wastes. The disposal procedures were further ranked to know the commonly practiced disposal method of biomedical wastes in the hospitals. Burning pit ranked first of the disposal methods while incineration ranked second of the disposal method practiced in the hospitals.

Table 6, shows the awareness of safety measures by health workers where all the respondents were aware of the need to comply with safety measures. The result showed adequate knowledge of the need for safety measures in handling biomedical wastes that will lead to proper attitude and practice in order to achieve safe environment for health workers, hospitals visitors and the general public.

Protective devices for handling biomedical wastes is shown in Table 7.

All of the 400 (100.00%) respondents agreed to the use of gloves, face masks, apron and safety boots. Also, most of the respondents agreed to the use of google.

The result of the study showed that all the respondents were aware and use personal protective equipment. This shows that the respondents portray proper attitude and practice towards prevention of occupational hazards. The study showed that there was relative compliance with the WHO standards that stipulates heavy duty gloves, boot and apron (Pruss *et al*., 1999). The finding in the study differed where only gloves were mainly used among other personal protective accessories (Awodele *et al*., 2016; Uchechukwu *et al*., 2017). This could be attributed to lack of funds and lack of awareness of safety measures. Adequate use of complete personal protective equipment is essential to anyone handling hospital wastes (Awodele *et al*., 2016).

Table 8 shows that there is a significance difference between the practices of handling biomedical wastes among the health workers and biomedical wastes management ($p \leq 0.05$). There is a significance difference between awareness of safety measures among health workers and biomedical waste management ($p \leq 0.05$) shown in Table 9.

Table 1. Socio-demographic Characteristics of Respondents

Socio-demographic Characteristics	**Category**	**Study Participants n (%)**
Gender	Male	220 (55.00)
	Female	180 (45.00)
Health Professionals	Doctors	64 (16.00)
	Nurses	115 (28.75)
	Laboratory Scientists	96 (24.00)
	Pharmacist	71 (17.75)
	Others	54 (13.50)
Years of Working Experience	1-5	98 (24.50)
	5-10	80 (20.00)
	10-15	88 (22.00)
	> 15	134 (33.50)
Educational Qualification	Bachelor's degree	343 (85.70)
	Fellowship	3 (0.75)
	Master's degree	6 (1.50)
	Doctorate	4 (1.00)
	Others	44 (11.00)
Member of Biomedical WMT	Yes	191 (47.75)
	No	209 (52.25)
Hospital Type	Public	289 (72.25)
	Private	111 (27.75)

Table 2. Percentage Frequency of Practices of Handling Biomedical Wastes

Items	**Positive Responses Frequency N (%)**
Intensive training and retraining of health workers on the effective waste management activities are performed	266 (66.50)
Segregation of infectious waste at the source of generation is prime indicator to achieving a sound medical waste management	398 (99.50)
Segregation is the essence of effective biomedical waste management practice therefore the responsibility of segregation should be that of the generator of biomedical waste	384 (96.00)

Waste management team is constituted to design waste management plan, policy documents and technical guidelines and supervision and coordination of waste management activities	302 (75.50)
Availability and enforcement of standard guidelines and biomedical waste management rules in health care facilities enhances effectiveness of biomedical waste management.	355 (88.75)
Biomedical wastes generated in the hospital should be collected on a daily basis and transported by Trolleys or Wheel barrows to a temporary storage site within the hospital	380 (95.00)
Biomedical wastes treatment leads to a reduction in volume of infectious waste and reduces the risk of transmission of diseases	400 (100.00)
Treatment of biomedical wastes enhances the safe transportation of biomedical wastes to the disposal site and minimizes transmission of diseases.	400 (100.00)

Positive responses = Agree/ Strongly Agree

Table 3. Percentage Frequency of Standard Operating Procedure (SOP) for Biomedical Waste Management

Items	**Positive Responses Frequency N (%)**
Segregation	375 (93.75)
Labelling	328 (82.00)
Treatment	315 (78.75)
Transport	295 (73.75)
Storage	255 (63.75)
Disposal	352 (88.00)

Positive responses = Agree/ Strongly Agree

Table 4. Percentage Frequency of Methods of Biomedical Waste Treatment

Items	**Positive Responses Frequency N (%)**
Disinfection	400 (100.00)
Autoclaving	286 (71.50)
Microwaving	66 (16.50)
Shredding	103 (25.75)

Positive responses = Agree/ Strongly Agree

Table 5. Percentage Frequency of Biomedical Waste Disposal Procedures

Items	**Positive Responses Frequency N (%)**	**TWF**	**RII**	**Rank**
Burning Pit	288 (72.00)	1595	3.99	1
Incineration	270 (67.50)	1572	3.93	2
Dumping	133 (32.25)	1183	2.96	3
Landfill	47 (11.75)	1016	2.54	5
Burial	118 (29.50)	1133	2.83	4
Recycling	75 (18.75)	1016	2.54	5

Positive responses = Agree/ Strongly Agree

Key: TWF- Total Weighted Frequency
RII- Relative Importance Index

Table 6. Percentage Frequency of Awareness of Safety Measures among Health Workers

Items	**Positive Responses Frequency N (%)**
There is need for compliance with standard biomedical waste rules and regulations for improved waste management in the hospital	400 (100.00)
Regular monitoring and evaluation of hospital waste management practices and the performance of the systems periodically enhances safe handling and disposal	400 (100.00)
There is need to educate and equip especially the on-site biomedical waste workers on the use of complete personal protective to prevent accidental injury by sharps	400 (100.00)
Protective accessories are important to minimize the risk of exposure to nosocomial infection among health workers	395 (98.75)
Trainings will improve safe handling and disposal of biomedical waste	400 (100.00)

Positive responses = Agree/ Strongly Agree

Table 7. Percentage Frequency of Protective Devices for Handling Biomedical Waste to minimize Occupational Hazards

Items	**Positive Responses Frequency N (%)**
Gloves	400 (100.00)
Face Masks	400 (100.00)
Apron	400 (100.00)
Safety booth	400 (100.00)
Googles	390 (97.50)

Positive responses = Agree/ Strongly Agree

Table 8. Relationship between Practices of Handling Biomedical Waste and Biomedical Waste Management

	Practices of Handling Biomedical Waste				
Biomedical Waste Management	**Good Practice (%)**	**Poor Practice (%)**	**Total**	χ^2	**p-value**
Good waste management	302 (83.6)	59 (16.4)	361 (100.0)	213.2894	0.000
Poor waste management	11 (28.2)	28 (71.8)	39 (100.0)		

The chi-square (χ^2) test revealed that there is relationship between practices of handling biomedical wastes and biomedical waste management since the p-value is (<0.05) therefore the alternative hypotheses is accepted, the practices of handling biomedical waste among health workers is a significant factor of biomedical waste management.

Table 9. Relationship between Level of Awareness on Safety Measures among Health Workers and Biomedical Waste Management

Biomedical Waste Management	**Level of Awareness on Safety Measures**		**Total**	χ^2	**p-value**
	High Awareness (%)	**Low Awareness (%)**			
Good Waste Management	395 (100.0%)	0 (0.0%)	395 (100.0%)	296.1934	0.000
Poor Waste Management	0 (0.0%)	5 (100.0%)	5 (100.0%)		

The chi-square (χ^2) test revealed that there is a relationship between the awareness on safety measures among health workers and biomedical waste management since the p-value is (< 0.05). The alternative hypothesis is accepted, and that the awareness on safety measures among health workers is a significant factor of biomedical waste management.

Conclusion

This study showed that there are gaps in the implementation of standard practices of handling biomedical wastes in the hospitals such as in the areas of transportation from point of generation, treatment, temporal storage and disposal. Awareness of safety measures and practices are appreciable however should be improved upon. Moreover, this study has shown that the practices of handling biomedical wastes and awareness of safety measures are related to biomedical waste management ($p \leq 0.05$).

Recommendations

Regular training, workshops and seminars on standard practices of handling biomedical wastes and safety measures among health workers to secure the health of the populace and the environment. The hospital management should regularly monitor and enforce the execution of proper handling procedures of biomedical wastes. Also, strict compliance to the use of personal protective equipment among health workers is critical in the prevention of occupational hazards. Involvement of government and related agencies to establish laws and policies for functional and sustainable system towards achieving an efficient biomedical wastes management.

References

[1] Awodele, O., Adewoye, A. A and Oparah, A. C. (2016) Assessment of medical waste management in seven hospitals in Lagos, Nigeria. Bio Medical Central *Public Health* 16-269.

[2] Chima, G.N., Abanobi O. C., Abaraogu, U.J. Uwalaka C, H. Asonye, I.C., Nwakpa, P. (2014) Hospital Waste generation and Management Practices in Owerri, Nigeria. *African Journal of Environmental Science and Technology* 8(11) pp 623-632.

[3] Chima, G.N., Ezekwe, I.C., Digha, N.O. (2011) 'An assessment of medical waste management in health institutions in Yenagoa, South-South, Nigeria'. *World Review of Science, Technology and Sustainable Development* 8 (2/3/4) pp.224–233.

[4] Debere M. K., Gelaye K. A., Alamdo A. G., and Trifa Z. M., (2013). Assessment of the health care waste generation rates and its management system in hospitals of Addis Ababa, Ethiopia, 2011. *BMC Public Health*, 13: 28-37.

[5] Denloye, A.A., Ojuromi, O.T., Ochei, K. and Ade-Serrano, E.A. (2018) Bio safety Knowledge, Waste Disposal Practices and Identification of Parasites in Biomedical Wastes from Healthcare Establishments in Lagos and Abuja, Nigeria. *Biomedical journal of scientific and Technical Research* 5(4) pp 4759-64.

[6] Deress, T. Hassen, F. *Adane*, K. and Tsegaye, A. (2017) Assessment of Knowledge, Attitude, and Practice about Biomedical Waste Management and Associated Factors among the Healthcare Professionals at Debre Markos Town Healthcare Facilities, Northwest Ethiopia. *Journal of Environmental and Public Health pp1-10.*

[7] Glenn, I. D. (1992) Sampling the Evidence of Extension Program Impact. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-5. October pp1-5.

[8] Muluken, A. Haimot, G., Mesafint, M. (2013). Healthcare waste management practices among health care workers in health care facilities of Gondar town. North West Ethiopia. Health Science Journal 7(3) pp 315-326.

[9] Ndiaye, M., EI Metghari, L., Soumah, M.M. and Sow, M.L. (2012). Biomedical waste management in five hospitals in Dkar, Senegal. *Bulletin Sociology Pathology Exot* 105(4) pp 296-304.

[10] Ngwuluka, N., Ochekpe, N., Odumosu, P. John, S. A. (2009) Waste management in healthcare establishments within Jos Metropolis, Nigeria. *African Journal of Environmental Science and Technology* vol (3)12 pp 459-465.

[11] Ola-Adisa, E. O. Mangden, Y.E. Sati, Y.C. and Adisa, J. O. (2015) "Knowledge, attitudes/beliefs and practices in medical waste management-an appraisal of Jos North LGA, Plateau State, Nigeria," *International Journal* of *Resaerch in Humanities and Social Studies* 2 (12) pp. 43–56.

[12] Patwary M.A., O'Hare, W. T. and Saker, M.H. (2011). Assessment of occupational and environmental safety associated with medical waste disposal in developing countries. A quantitative approach. *Safari Science* 49 (8-9) pp1200-1207.

[13] Rahda K.V., Kalaivani K. and Lavanya R. (2009). A Case Study of Biomedical Waste Management in Hospitals. *Global Journal of Health Science*s 1(1) pp82-88.

[14] Rao, S.K.M., Ranyal, R.K., Bhatia, S.S., Sharma, V.R. (2004). Biomedical waste management: An infrastructural survey of Hospitals. *Medical Journal of Armed Forces India*, 60(4): 379-382.
[15] Uchechukwu, E.E., Babatunde, I. O. and Ndu A. C. (2017) Investigating Knowledge, Attitude and Health Care Waste Management by Health Workers in a Nigerian Tertiary Health Institution. *Global Journal of Health Science* 9 (4) pp 222-232.
[16] Udofia E. A., Fobil, J. N. and Gulis, G. (2015). Solid medical waste management in Africa. *African Journal of Environmental Science and Technology* 9(3) pp 244-254.
United Nations Fund for Population Activities (2015) UNFPA in FCT, Abuja. WHO (2011). Health-care waste management: Health-care waste needs sound management, including alternatives to incineration.
[17] Useh, U, J, Lawal, H.M., Useh, M. U., Akpan, E. G. and Ibrahim, K. (2018). Assessment of Medical Waste Generation at a Medical Center in Keffi Metropolis. *American Journal of Biological and Environmental Statistics* 4(1) pp 31-41.
[18] Yelebe, Z.R., Revelation J. S and Blessing Z. Yelebe, B. Z. (2015) Biomedical Waste Treatment: A Case Study of some Selected Hospitals in Bayelsa State, South-South, Nigeria. *American Journal Engineering Research* 4 (6) pp-160-164.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art013

Testicular Torsion in an Adult Male: A Case of Neglected Torsion

Mukambo Chinayi[1], Nkomba Chamileke[2]*, Bassem Wayed[3]
[1]*University of Zambia, School of Medicine*
[2, 3]*University Teaching Hospital*
**Corresponding Author: nchamileke@gmail.com*

Abstract

Testicular torsion is a true surgical emergency caused by twisting of the testicle on the spermatic cord leading to disruption of the vascular supply and time sensitive ischemia with or without necrosis of testicular tissue. The annual incidence is 1 in 4000 males under the age of 25 years globally, with peak presentation in adolescents between 12 to 16 years as well in the neonatal period. However, there are rare cases in which adult males present with testicular torsion and this case study explores one such instance looking at it's unique features and at the same time underscoring an important point that torsion can occur outside the bimodal peak. The case report illustrates that age distribution maybe clinically misleading and should not be relied upon for a diagnosis.

Keywords *testicular torsion, epididymitis, surgical emergency, ischemia.*

Introduction

Testicular torsion refers to a condition in which there is twisting of the spermatic cord leading to decreased blood flow to the testicle resulting in ischemia/infarction and tissue necrosis [1]. The annual incidence is 1 in 4000 males under the age of 25 years globally [2] with peak presentation in adolescents between 12 to 16 years and the neonatal period [3]. Testicular torsion is a common urological problem affecting 1 in 4000 males below the age of 25 [4]. It is a urological emergency hence the need for every medical practitioner to be able to diagnose the condition or consider it as a differential in patients presenting with acute scrotal pain. This however is easier said than done because not all patients with testicular torsion fit the classical clinical vignette which is that testicular torsion is mostly a condition which has a bimodal peak affecting neonates and adolescents between the ages of 12 to 16 years [5] and this case report looks at a unique case where an adult male presented with testicular torsion.

Case report

NM, Male 27 years, presented to the emergency department of the University Teaching hospital (UTH) with a 4day history of right sided testicular pain. NM was referred from one of the local clinics. The pain was of sudden onset and it started while the patient was cleaning around the house. The pain was mostly felt in the right scrotal area, it was sharp, severe and was associated with localised swelling. On the same day he visited the local clinic where he was given painkillers (diclofenac) which alleviated the pain. He was also started on antibiotics (doxycycline and then ciprofloxacin for 3 days). However, he had no hx of dysuria, genital discharge or fever, there was also no hx of nausea and vomiting. The patient`s swelling persisted despite analgesia and antibiotics and 4 days later he was referred to UTH. He is not hypertensive or diabetic, he is HIV negative and has no hx of a similar presentation. There is a hx of alcohol intake and smoking.

On examination, he was afebrile to touch and vitals were in the normal range. Respiratory, cardiovascular and gastrointestinal systems were clinically clear. Local exam: inspection of the perineum showed normal hair distribution and normal genitalia, right hemi scrotal swelling. On palpation the right testicle was tender, elevated compared to contralateral testis and horizontal lie. Prehn's sign was negative. Left testicle was normal. Doppler ultrasound done 4 days after onset of symptoms revealed no vascularity on the right testis and hypoechoic texture while the left testis was normal. Patient was taken to theatre on day 7 (one week after onset of symptoms). Scrotal exploration was carried out and the

findings were as follows: right testicular torsion with adhesions and necrosis, left testis viable (figure 1). Surgeon proceeded to do a right orchidectomy and left orchidopexy and closed up with sutures.

Patient was placed on painkillers (diclofenac 75mg/1ml/BD and pethidine 100mg QID), and antibiotics (ceftriaxone 1g and metronidazole 500mg TDS).

Discussion

As stated earlier stated testicular torsion is a urologic emergency caused by the twisting of the testicle on the spermatic cord leading to constriction of the vascular supply and time sensitive ischemia and/or necrosis of the testicular tissue [6]. Torsion maybe extravaginal or intravaginal. Intravaginal testicular torsion is the more common type occurring frequently at puberty. It results from anomalous suspension of the testis by a long stalk of spermatic cord resulting in complete investment of the testis and epididymis by tunica vaginalis. This anomaly is called 'Bell clapper deformity'. Bell clapper deformity is present in approximately 12% of males:40%of them are affected in both testicle[7]. Extravaginal testicular torsion most often occurs in new-borns without the Bell clapper deformity. It is thought to result from a poor or absent attachment of the testicle to the scrotal wall allowing rotation of the testicle, epididymis and tunica vaginalis as a unit causing torsion of the cord at the level of the external ring[8]. Risk factors for testicular torsion include the following: top of the list is age, testicular torsion has a bimodal distribution affecting mostly neonates and adolescents between the ages of 12 to 16 years. It rarely affects adults and so it is missed sometimes in adult males presenting with acute scrotal pain as they are misdiagnosed with epididymitis and this is a common mistake as this case report has highlighted. Other risk factors include history of cryptorchidism, horizontal testicular lie and increased spermatic cord length.

With regard to aetiology, testicular torsion often occurs spontaneously without any perceivable cause by the patient but some factors that may precipitate torsion of the intravaginal type include; congenital anomalies, bell clapper deformity, undescended testis, sexual arousal or activity, exercise, active cremasteric reflex and cold weather. Torsion may be clockwise or anticlockwise. In terms of pathophysiology, testicular torsion occurs as the testicle rotates between 90° and 180° compromising blood flow to and from the testicle[8]. Complete torsion usually occurs when the testicle twists 360°or more while incomplete or partial torsion occurs with lesser degrees. Classic presentation of testicular torsion is acute onset intense unilateral scrotal pain (less frequently abdominal and inguinal pain), nausea and vomiting, trauma and similar pain in the past[9]. On physical exam unilateral tender and firm testicle, scrotal erythema, oedema, loss of cremasteric reflex and affected testicle is typically higher.

With all this information we have a clear picture of how a patient with torsion would present but when we look at our patient it is evident that he does not fit into this classic presentation of testicular torsion. To begin with our patient is beyond the usual age range of 12 to 16. The patient is 27 years old which is outside the normal bimodal age distribution of this condition, this is very unique and it underscores an important point which is that testicular torsion can occur at any age. Torsion has even been documented in much older patients, one even as old as 67[10]. So, doctors need to have a high index of suspicion in every male presenting with acute scrotal pain because testicular salvage is only possible within 4-6 hours after torsion. Another unique feature of this case is the pattern of pain felt by the patient. As stated earlier pain classically caused by testicular torsion is intense, unrelenting and most times disabling but the patient was able to relieve the pain with painkiller (diclofenac) and actually took him a few hours to visit the clinic where unfortunately due to the unusual presentation (age and pattern of pain) a wrong diagnosis of epididymitis was made and patient was actually started on antibiotics(doxycycline then ciprofloxacin for 3 days). Four days passed before the patient was referred to UTH where a diagnosis of torsion was made on admission. The salient lesson here is although torsion usually occurs around puberty and epididymitis typically affects sexually active men after the age of 20 years, age distribution maybe clinically misleading and should not be relied upon heavily for a diagnosis [10]. Also, the pattern of pain in testicular torsion is not always the classic intense unyielding pain, sometimes it responds well to painkillers as in this case and some times pain can even be intermittent as in some reported cases of intermittent testicular

torsion (ITT)[12]. One can even add the fact that the patient presented at a warmer time of the year which usually is not the case[8].

Conclusion

The case presented outlines the importance of having a high index of suspicion in patients who present with acute scrotal pain regardless of age despite the classical presentation following the bimodal peak of neonatal period and adolescence.

All these unique features of this case leave us with a myriad of questions as to what could have caused such a presentation but also provides us with a great learning opportunity from a unique presentation of testicular torsion in an adult male.



Figure 1. Picture showing area of torsion (blue arrow) as seen during surgery

Acknowledgments

I would like to thank the staff of the urology clinic at the University Teaching Hospital and the patient for permission to use their information as a case report.

References

[1] Ringdahl, E., Teague, L. ,2006, Testicular torsion. Am Fam physician. 2006 Nov 15;74(10):1739-43.

[2] Karen, C., JaNeille, S., Gerry H ,2011, Testicular torsion: A case study and evaluation of young men's knowledge about testicular pain. W Vamed J207 :35-37.

[3] Lahdes-Vasama, T., Rajakorpi H, Wikstöm, S., 2007, A 19-year review of paediatric patients with acute scrotum. Scand S Surg. 2007:96:62-66[PubMed] [Google Scholar].

[4] Ringdahl, E., Teague, L.,2006, Testicular torsion, Am Fam physician. 2006 Nov 15;74(10):1739-43.

[5] Kallerhoff, M., Gross, A. J, Bötefül, J. C, 1996, The influence of temperature on changes in pH, lactase and morphology during testicular ischemia. The British journal of urology, vol 78, no.3 pp 440-445,1996.

[6] Dogra, V., Bhalt, S, 2004, Acute painful scrotum. Radiol Clin North Am.2004; 42:349-363[PubMed].

[7] Marcozzi, D., Suner, S,2001, The non-traumatic acute scrotum. Emerg Med clin North Am 2001; 19:547-567[PubMed].

[8] Farrington, N, L., Lucky, MA, Bannes, T., Calvert, R,2014, Confirmed testicular torsion in a 67-year-old. J surg case Rep. 2014;1[PMC free article].

[9] Gordhan, C. G., Sadeghi-Nejad H.,2015, Scrotal pain: evaluation and management. Korean J Urol.2015:56(1):3-11 doi: 10.4111/KSU.2015.56.1.3[PMC free article] [PubMed].

[10] Eaton, S.H., Cendron, M.A., Estrada, C.R., Bauer, S.B., Borer, J.G., Cilento, B.G., Diamond D.A., Retik, A. D., Peters, C.A.,2005, Intermittent testicular torsion: diagnostic features and management outcomes. JUrol.2005, 174:1532-1535[PubMed] [Google Scholar].

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art014

To Establish the Relationship between Socioeconomic Status to Mental Illness

Edna Chirwa Simwinga
Texila American University – Zambia
E-mail: ecsimwinga@gmail.com

Abstract

It is cardinal to note that several studies have revealed that there is a robust relationship between socioeconomic status (SES) and general physical health. These findings that can be generalized to Zambia. Zambia which is one of the most urbanized countries in sub-Saharan Africa, there are assumptions that it is possible that social, and economic factors may contribute to the mental health of the people. The purpose of this study is to establish the relationship between socioeconomic status, home environment, and mental illness in Zambia. In order to guide the paper, the aim was to establish the relationship between socioeconomic statuses to mental illness. A quantitative methodology was used whereby data was collected using questionnaires from the respondents.

The results established that low school accessibility is associated with higher risk of mental illness among younger men (20–31) and women (20–45), while it is a slightly protective factor for elderly individuals of both sexes. The association between social inequalities and the manifestation of psychological instability symptoms has been observed in relation to unemployment, lower education, low income and some material deprivation and most severely affects women of low SES, children, adolescents and the elderly. In the data, a low level of education and inactivity shows the strongest effect on the incidence of mental disorders, particularly among unemployed men.

Keywords*: Social economic status, Mental illness, Physical health.*

Introduction

Socioeconomic status (SES) can be looked at as a theoretical construct encompassing individual, household, and/or community access to resources (Adler et al., 2000). However, it is usually conceptualized as a combination of economic, social, and work status, measured by income or wealth, education, and occupation, respectively (Pollack at al., 2007). In this vein, SES has been linked to a wide range of health-related exposures and outcomes, including undernutrition, chronic disease, infection and mental health disorders. For instance, evidence has shown that the poorer one's socioeconomic conditions are, the higher one's risk is for mental disability and psychiatric hospitalization (Pickett et al, 2006). In light of the above, it is critical to make mention that mental illness tends to be on the increase in Zambia both in the rural and in the urban areas. Like many other developing countries, Zambia experiences a number of challenges around mental health including shortages of mental health facilities and professionals especially in the developing countries, stigma associated with the illness, lack of adequate policies, inadequate resources, among others (Siwo, 2018).

Although there are psychiatric units within seven general hospitals across the country, and the mental health policy in the country has made a commitment to integration, mental health services in Zambia are largely delivered at Chainama Hospital in Lusaka, the only mental health hospital in the country (Siwo, 2018). In addition, there is a dearth of research on mental health generally in Zambia (Kapungwe et al., 2010) with currently no research having been conducted on issues around integration of mental health with primary health care and thus the importance of this study. The major aim of this paper was to establish the link between Socioeconomic Status and mental illness. The study further wanted to establish the relationship between home environmental and mental illness in Lusaka, Zambia.

Most studies that have been carried out to investigate factors influencing mental illness have concentrated on sex, age, and ethnicity rather than SES (American Psychology Association, 2011). Therefore, there is needed to

get a comprehensive understanding of how SES influences mental illness. Thus, conducting this study in a developing country like Zambia would contribute to a more comprehensive understanding of how SES influences mental illness. This could further policy and provision of mental health services in Zambia. Therefore, there it is essential to better understand of this relationship for the purposes of planning preventive activities and health care provision.

Literature review

Suffice to note that mental illnesses worldwide are accompanied by another pandemic, that of stigma and discrimination (Kapungwe et al., 2010). In many instance, mental illness tends to strike with a double-edged sword, with those affected having to deal with the symptoms and disabilities of their illness on the one side, and widespread stigma and discrimination on the other. There have been a great number of studies that have been done on mental health in the western worlds (Crisp et al., 2000; Jacob et al., 2007). However, there has been very few studies conducted in Africa have suggested that the experience of stigma by people with mental illness may in fact be common.

For example, in their study investigating knowledge and attitudes of the general South African public towards mental illness, Hugo and colleagues found that knowledge was low and stigma was high. Such stigma appeared to be associated with the fact that mental illnesses were understood as a lack of willpower, and stress-related, rather than medical illnesses (Hugo et al., 2007).

Another example can be seen in Nigeria, where the first large-scale, community representative study of popular attitudes towards mentally ill, found stigma to be widespread, with most people indicating that they would not tolerate even basic social interactions with someone with a mental illness (Gureje et al., 2005). These preliminary findings thus confirm Corrigan and Watson's assertion that the lack of empirical data in African countries may explain the speculation that stigmatisation and discrimination towards mental illness is less common in these societies. More studies on the continent are needed in order to avoid ill-informed assumptions, and to prevent uncritical transposition of findings from western contexts to Africa, given cultural and structural regional differences.

Relationship between Socioeconomic Status and Mental Health

Results from previous studies show strong associations between mental health for instance, social relations, income, working conditions and critical life events.

Korkeila et al. (2003) conducted a study in order to present background work for developing a number indicator of mental health indicators to be included in part of an all-inclusive health monitoring system in Europe. A functional model of mental health was used to delineate variables essential for mental health indicators. The study ended up with a number of mental health indicators that could heighten the visibility of mental health problems in the European setting. This review included different studies that employed various methodologies rendering it difficult to compare the results. Furthermore, the socio-economical setting is very different from the Zambian setting.

Previous studies have followed two main research approaches to decide the temporal order between mental illnesses and SES. The first depends on old self-reports of study participants. For instance, a study by Kessler (2005), to determine the temporal order between mental disorders and school dropout by trusting on the study participants' ability to remember their mental state prior to major educational moves, such as high school completion and college entry. On average, the study participants were asked to recollect their mental state fifteen years before the study time. Such studies relying on retrospective self-reports find evidence for the selection perspective to the extent that study participants who were unsuccessful in making major educational transitions recounted an overrepresentation of anxiety disorders, mood disorders and conduct disorder that pre-existed their school dropout.

It is important to note, conversely, that findings based on such analyses utilization in this research design are based on the assumption that retrospective self-reports of the incidence and timing of childhood and adolescent mental illnesses are valid and reliable. This is very debatable. To avoid such a pitfall, participants should only be asked to recollect and retell their very recent and current episodes respectively.

Furthermore, information collected from mental health workers as well as relatives of patients would help verify data.

Research Methodology

This research used a combination of descriptive and analytical methods. The combination of the research designs was necessary because of the nature of the study. It was considered to be appropriate because this type of study gave an insight about the nature and causes or clear picture of a certain problem or situation. This study employed a quantitative approach. The quantitative inquiry investigates the quantities by finding out what happens, how it happens and importantly why it happens the way it does (Creswell, 2005).

The research was conducted in Lusaka Province of Zambia. The research was carried out from Lusaka district. Lusaka is an administrative town of Lusaka district. There were reasons for choosing to conduct the research in Lusaka province. First, it was where the researcher works from. Secondly, the provinces had a number of urban Health Centres which offer mental health services at primary level. Third, there were a high number Enrolled Psychiatric Nurses, Registered Mental Health Nurses and Clinical Officers who offer services to the mentally ill in the area. Fourth, there were libraries and communication facilities which enabled the researcher to conduct detailed research.

The study population consisted of nurses and clinical officers in health centres (stratified by rural-urban); mental patients; and relatives to the mental patients who escorted them for reviews at the Out-Patient Department / filter clinic at Chainama Hills Hospital. Purposive sampling was used to select the health centres and medical personnel in these facilities; whereas the mental patients were selected on voluntarism basis by their relatives. There relatives had to consent for them to be part of the study.

A sample size comprised of 10 mental health workers (nurses and clinical officers); 100 mentally ill patients between the age of 15 - 60years and those who have been diagnosed with HIV and are currently on medication; and 100 relatives. Data collections tools included structured questionnaires for mental health workers; and semi-structured interview guides for mental patients and their relatives.

The collected data was checked for accuracy, consistence and completeness before subjected for analysis. The study performed both qualitative and quantitative analysis procedures. Qualitative data was analysed using content analysis through narratives to interpret the findings given. On the other hand, quantitative data was analysed using a Statistical Package for Social Sciences (SPSS) and Microsoft Excel. The data was presented in tables, pie charts, bar charts and graphs according to the need.

All ethical issues were taken into account during the investigation. For instance, for the interviews of the study, informed consent and assent (in the case of the mental patients) was obtained from all participants after the objectives and the methodology of the study have been explained to them. Prior to obtaining consent, participants were assured of privacy and strict confidentiality of information provided by them which would not be revealed to any third party. Further, all responses were coded, thus allowing for respondents to remain anonymous in order to further assure confidentiality.

Data analysis

The study targeted a total of 10 mental health workers and 100 mental PLWHA and their relatives. However, the study only managed to capture 90 mental PLWHA. The study established that majority of the mental health workers were female (60%, n=6); nurses (70%, n=7); between the ages 25-35 years (50%, n=5); earned an income below ZMK 5, 000 (50%, n=5); and were residents from a high-density area (70%, n=7) (*see table 1).*

Table1.: Background Characteristics for mental health workers

Gender	**Frequency (n)**	**Percentage (%)**
Male	4	40
Female	6	60
Age		
Below 25 years	3	30
25-35 years	5	50

Above 35 years	2	20
Occupation		
Nurse	7	70
Clinical Officers	3	30
Income		
Below ZMK 5, 000	5	50
Between ZMK 5, 000 - ZMK 10, 000	4	40
Above ZMK 10, 000	1	10
Residence		
Low density area	2	20
Medium density area	1	10
High density area	7	70
TOTAL	**10**	**100**

Source: Field Data

The study further established that majority of the mental PLWHA were female (55.6%, n=50); between the ages 25-35 years (66.7%, n=60); had never been married before (66.7%, n=60); had an education attainment of primary level (61.1%, n=55); and were from a high density area (85.6%, n=77) (*see table 2).*

Table 1. Demographics Characteristics of Mental PLWHA

Gender	**Frequency (n)**	**Percentage (%)**
Male	40	44.4
Female	50	55.6
Age		
Below 25 years	20	22.2
25-35 years	60	66.7
Above 35 years	10	11.1
Marital status		
Never married	60	66.7
Ever married	30	33.3
Education attainment		
Primary	55	61.1
Secondary	25	27.8
Tertiary	10	11.1
Occupation		
Employed	20	22.2
Not employed	70	77.8
Residence		
Low density	3	3.3
Medium density	10	11.1
High density	77	85.6
TOTAL	**90**	**100**

Source: Field Data

The study endeavoured to assess the type of mental disorders that were prevalent among the patients that participated in this study.

Table 3. Prevalence of Mental Disorders by Type

Types of Anxiety Disorder	Frequency (%)
Agoraphobia	8 (8.9)
Social phobia	19 (21.1)
Specific phobia	7 (7.8)
Panic disorder	6 (6.7)
Mixed anxiety depressive disorder	16 (17.8)
General anxiety disorder	9 (10.0)
Anxiety disorders unspecified	25 (27.8)

Source: Field Data

Table 3 shows that the most prevalent mental disorder that was recorded were unspecified anxiety disorders (27.8%, n=25). However, of those that were specified, the most prevalent was social phobia (21.1%, n=19); mixed anxiety depressive disorder (17.8%, n=16); general anxiety disorder (10.0%, n=9). The rest were below ten percent of the total number of mental PLWHA.

Suffice to note that all the mental health workers that were selected in this study had undergone some training on handling mental patients. However, the study endeavoured to enquire on how these mental health workers perceived their interactions with Mental PLWHA. Figure 1 below shows that 70% (n=7) felt comfortable with the interaction they had with mental PLWHA. However, 20% (n=2) surprisingly felt uncomfortable with their interactions with the mental PLWHA. They asserted that it is somehow risky on their health and well-being in some cases.

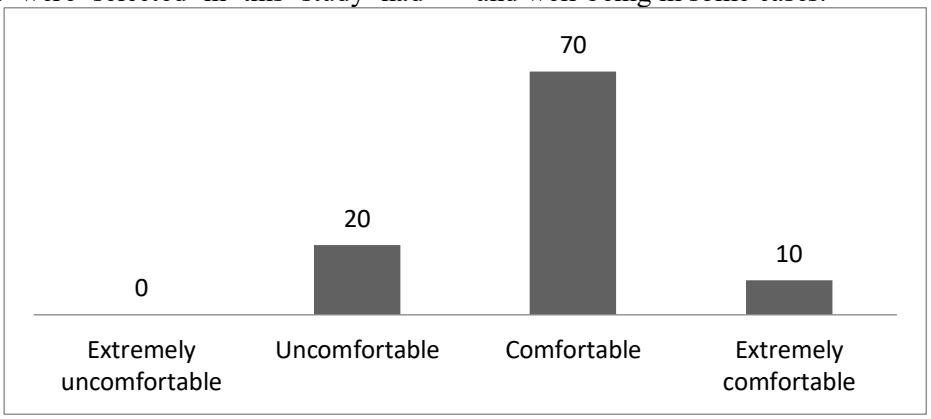

Figure 1. Perception on treating and interaction with Mental PLWHA

Source: Field Data

A correlation analysis on the demographics of Mental PLWHA and types of anxiety disorders (being the most prevalent mental disorder recorded) was conducted (*see table 4)*

Table 4. Correlation analysis on the demographics of Mental PLWHA

Anxiety Disorders Versus Variables	Correlation coefficient (*r*)	p value
Gender	−0.55	0.260
Religion	−0.11	0.844
Younger age	−0.62	0.039
Unemployment	0.78	0.004
Lack of family support	0.70	0.181
Education	0.81	0.412
Married status	0.18	0.002
Duration of HIV illness	0.831	0.327
Negative history of mental illness	−0.891	0.021
HIV test counselling	−0.77	0.188

Source: Field Data

It was established that there was a strong correlation coefficient of education (0.81), unemployment (0.78), lack of family support (0.70) and duration of HIV illness (0.83) on anxiety disorders.

Conversely, correlation analysis was used to measure the association of the SES and environmental characteristics of the mental PLWHA to assess the possible correlates between the independent and dependent variables. It was established that there were high positive correlations between family support (0.93), stigma in the home (0.89), income (−0.87) and education (0.83) on the mental health of an individual.

Furthermore, there was also a higher correlation with regards to history of mental illness (0.801). Moderate positive correlations were deduced with regards to residential stability (0.78), education status in the home (0.77) and technology (−0.55). No correlations were found with regards to rural (0.21) and urban density (0.22) (*see table 3).*

Among built environment indicators for men, accessibility by public transport and urban density seem to influence the variations of mental disorders only after age 50. For women, the protective impact of accessibility by public transport is statistically significant in each age group, and urban density only has a protective impact after the age of 50.

Table 5. Correlation Analysis on Mental PLWHA

Mental illness versus variables	**Correlation coefficient (r)**	**p value**
Family support	0.93	0.114
Stigma in the home	0.89	0.301
Income	−0.87	0.047
Education	0.83	0.251
Rural	0.21	0.002
Urban density	0.22	0.018
Residential stability	0.78	0.381
Education status in the home	0.77	0.290
History of mental illness	0.801	0.017
Technology	−0.55	0.098

Source: Field Data

Discussion

In Lusaka, the incidence of mental instability symptoms among adults, as measured by any prescription of antidepressant drugs, decreases with the improvement of some specific features of the urban built environment. This is primarily related to the protective effect of urban density and of accessibility by public transport, with stronger effects evident among women and older adults. This association is true irrespective of the individual level of social disadvantage and the degree of challenges in the neighbourhood.

The association between social inequalities and the manifestation of psychological instability symptoms has been observed in relation to unemployment, lower education, low income and some material deprivation and most severely affects women of low SES, children, adolescents and the elderly (Muyeya, 2004). In the data, a low level of education and inactivity shows the strongest effect on the incidence of mental disorders, particularly among unemployed men.

Physical disorder refers to a perception of urban decay as measured by complaints to local authorities and is strongly related to a sense of safety (Myer et al., 2008). This has been identified in the literature as one of the key determinants of health outcomes, particularly mental health. As information about the social environment is drawn from reported complaints, it is important for the researcher to be cognisant of the possibility of a bias that is due to over notification or misclassification.

Aspects of the home environment have been primarily identified through physical indoor housing and working conditions. Home and work environments are the built environment determinants with strongest health effects, since these are the places where people spend the

majority of their time. Some of the direct effects on health due to the outdoor urban environment are more difficult to isolate and are recognized to be of minor intensity. In addition, the urban built environment can have an important impact on mental health through indirect pathways.

Recommendations

- Home and work environments have to be stress free spaces since most people spend the majority of their time there.
- People must make time to talk to someone at work or at home so that they can share and vent of their stress.
- Awareness campaigns so that the younger generations desist from dropping out from school and the use of drugs.
- Government must equip the young generation with entrepreneurial skills that improve their livelihoods so that they will not be affected by the stress of making ends meet.

Conclusion

In conclusion, there is indeed some positive relationship between socioeconomic status and mental illness. Lack of education and physical disorders are some of the socioeconomic factors leading to mental illness. The state must stand as watchdogs so ensure the wellbeing of every citizen thus dealing with the scourge of mental illness.

References

[1] Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of Subjective and Objective Social Status with Psychological and Physiological Functioning: Preliminary Data in Healthy White Women. Health Psychology, 19, 586 – 592.

[2] American Psychological association. (2011). Children, Youth, Families and Socioeconomic Status. APA. Retrieved from Children, Youth, Families and Socioeconomic Status on 2017 January, 25.

[3] Creswell, J. (2005). Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research (Second Edition). New Jersey: Pearson.

[4] Högberg, T. and Magnusson, A. (2005). "To be a nurse or a neighbour? A moral concern for psychiatric nurses living next door to individuals with a mental illness." Nursing Ethics, 12(5), 468-478.

[5] Jacob KS, Sharan P, Mirza I, Garrido-Cumbrera M, Seedat S, Mari JJ (2007): Mental health systems in countries: Where are we now?. Lancet. 2007, 370: 1061-1077. 10.1016/S0140-6736(07)61241-0.

[6] Kapungwe A, Cooper S, Mwanza J, Mwape L, Sikwese A, Kakuma R, Lund C, Flisher A J, MHaPP Research Programme Consortium (2010): Mental Illness--Stigma and Discrimination in Zambia. Afr J Psychiatry (Johannesbg). 2010 Jul;13(3):192-203.

[7] Kessler, R. C., Demler, O., Frank, R. G., Olfson, M., Pincus, H. A., Walters, E. E., Zaslavsky, A. M. (2005). Prevalence and treatment of mental disorders, 1990 to 2003. New England Journal of Medicine, 352, 2515–2523.

[8] Knapp M, Funk M, Curran C, Prince M, Grigg M, McDaid D (2006): Economic barriers to better mental health practice and policy. Health Policy Plan. 2006, 21: 157-170. 10.1093/heapol/czl003.

[9] Korkeila J, Lehtinen V, Bijl R, Dalgard AS, Kovess V, Morgan A, Salize HJ. (2003). Establishing a set of mental health indicators for Europe. Scandinavian Journal of Public Health, 31, 451-9.

[10]Mayeya, J. (2004). "Zambia Mental Health Profile," International Review of Psychiatry. 16 (1-2) 63-72. Accessed from http://www.ncbi.nlm.nih.gov/pubmed/15276939; June 27, 2011.

[11]Myer, L., Stein, D.J., Grimsrud, A., Seedat, S. and Williams, D.R., (2008). Social Determinants of Psychological Distress in a Nationally-Representative Sample of South African adults. Social Science & Medicine, 66(8), pp.1828-1840.

[12]Palitza, K. (2009). "Mental Illness in HIV-Positive Patients Largely Ignored", accessed at http://ipsnews.net/news.asp?idnews=47138; on June, 10, 2011.

[13]Pickett KE, Wilkinson RG. (2006). Child wellbeing and income inequality in rich societies: ecological cross-sectional study. BMJ 335:1080–87.

[14]Pollack CE, Chideya S, Cubbin C, Williams B, Dekker M, Braveman P (2007): Should Health Studies Measure Wealth? A Systematic Review. Am J Prev Med. 2007 Sep;33(3):250-64. doi: 10.1016/j.amepre.2007.04.033.

[15]Siwo C. (2018). Young People and Mental Health in a Changing World. Health Press Zambia Bull.

Texila International Journal of Academic research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.07.02.Art015

Human Characteristics Prediction from Social Media Data

Mustapha Bin Danquah
Department of Education, Texila American University, Saudi Arabia
E-mail: asalat2007@gmail.com

Abstract

With 2.19 billion users, Facebook is one of the most famous and prosperous social network services (SNS). Because of its pervasiveness and especially concerning the recent issue on the collection of personal data of both users and non-users, some experts and psychologists believe that users are influenced to behave in certain ways vastly different from their usual behaviour. The present study provided insight into why students adopt a characteristic or identity in this online setting via a thorough examination of the student's level of participation on Facebook. The descriptive research design was employed for the study. The sample size used was 240 drawn from the first and third-year undergraduate students of the University of Ghana (UG). Purposive sampling technique was adopted for sample selection. The main research instrument for the study was a questionnaire. The study revealed that most of the students were digitally inclined and is very active on Facebook. It was also seen that due to the visual possibilities of Facebook, students tailored their characteristics or identity towards wanting their audience to like them, to be desired by their girlfriend and sought after by popular users. It was also discovered that unlike anonymous media such as chat room, users can be held accountable for deviant behaviour on the Facebook environment because pertinent information about them are kept and shared with third parties.

Keyword: *Developmental psychology, Social Network Service, identity management, construction of identity, the performance of identity.*

Introduction

In recent times, the construction of identity online has drawn much attention from psychologists in the social network field. Experts in developmental psychology such as Zacarias- Gonzalez, Iborra, Tomas, and Serra (2009) posited that identity construction has proven to be a major concern faced by young adults. Experts described identity as a coherent conception of oneself that includes the targets, values, and beliefs to which we make a firm commitment, it is psycho-social and is often influenced by self-concept, interpersonal relations and individual surroundings (Trimble, Root, & Helms, 2003; Perez-Torres, Pastor-Ruiz, & Ben-Boubaker, 2018). Studies on the prediction of human characteristics utilizing social network service, according to Perez-Torres et al. (2018), is focused on understanding how people construct their identity in a virtual or unreal world void of physical contact.

Herring and Kapidzic (2015) and Lin, Fang, and Jin (2017) conducted extensive investigation and research on the anonymous online environment such as chat forums and their findings revealed that users are predisposed to hiding their true identity and take on a different identity that may closely resemble their innermost desire and aspirations especially in connection with things they cannot do in the real-world or offline. Users resorted to this type of identity construction due to the anonymous nature of the online environment of which users are less culpable. These findings fanned the interest of several researchers on social network service, including Ellison et al. (2006), Waheed, Anjum, Rehman, and Khawaja (2017) and Perez-Torres et al. (2018) to investigate how users construct identities in anonymous (i.e opposite of anonymous) online environment, especially on sites that identity is extremely important, such as internet dating sites.

Results of their study revealed that people constructed their identity differently on these sites (internet dating), their behaviour or actions revealed a sense of awareness of the anonymous online environment, of which their actions or

behaviour may be consequential. The result of Ellison et al, Waheed et al. and Perez-Torres et al. underpin the objectives of this study, because it vividly revealed that online environment was not constitutive of a single unit, it has shades of variation suggesting that how individuals constructed identity or presented themselves varied significantly from one online setting to another. Given this variation, the present study will carry out an extensive investigation into how users on Facebook, anonymous and social networking site, construct identity or perform self-presentation. The focus of the study is on university students because this social networking site – Facebook has become very popular with university students in Ghana.

Objectives of the study

To fully understand the various ways students' identity can be understood on social media (Facebook), the present study has as its objectives the following:

i. To investigate how often students, visit Facebook
ii. To ascertain how often students, update their profiles on Facebook
iii. To establish how students, perform and construct their identities on Facebook.

Research questions

i. How often do users visit Facebook?
ii. How often do users update their profiles on Facebook?
iii. How do users construct and perform their identity on Facebook?

Significance of the Study

The significance of this study cannot be overemphasized at a time when using Facebook, with 2.19 billion monthly active users, is considered a laudable achievement and 'keeping up with the Joneses' (Kearney, 2018). This study is also timely because of the mounting pressure on Facebook executives to review their privacy policies with less monitoring of messenger messages, to make the service less anonymous (Roettgers, 2018, p. 1). It is envisaged that result of the study will provide insight into the privacy issue and its impact on the construction of identity on Facebook. Moreover, the study would serve as an impetus in understanding the several forms of identity student are prone to create while on Facebook and add to the literature on prediction of human characteristics on social networking sites.

Facebook

Interested in putting his computer science skill to good use, coupled with his sophomoric sense of humour to create a type of "hot or not" game for Harvard students, Mark Zuckerberg, along with classmates Eduardo Saverin, Dustin Moskovitz, and Chris Hughes invented a social networking website called Facebook. This social networking website was initially made to assist Harvard University student to interact socially and get to know each other (Bellis, 2013). Initially, membership to the website was at first restricted to Harvard University students. However, other universities and colleges were later incorporated into this popular social networking site with the help of Zuckerberg's colleagues. For example, Severin improved the business section of the website, Moskovitz worked as a programmer, and McCollum as a graphic artist. In a short while, Facebook opened up for all audiences and has been growing in leaps and bounds ever since.

Facebook differs from other social networking sites because only users or friends who are part of the same network could view each other's profiles and posts. Unlike Twitter, users do not have access to all the messages on the site. Another unique feature of Facebook is that it allows applications of third parties to have access to certain user information via quiz or game. The website is structured to collect useful information when participants use a tool and give permission to the application to use their personal information.

Additionally, unlike Hyves, Twitter, Blackplanet and Flickr, Facebook was initially designed to host a specific audience, but due to its evolving nature as indicated by Boyd and Ellison (2007), it has embraced other users and has gained worldwide acclaim as a powerful social networking site. However, Facebook also has a marked limitation in that it grants users limited freedom of expression to construct identity or make self-presentation, users cannot choose their background and colours of their page, they have to stick to default settings.

Due to its curtailment of users' ability to feign the ideal personality, Facebook informs an ideal condition for examining identity construction in online environments where most

of the users are friends and can readily meet each other when not online. It is expected that people would engage in identity construction on Facebook and adopt various ways of presenting themselves in a bid to deal with the less anonymous environment. In essence, the way Facebook is structured underpins the present study because it facilitates prediction of user's characteristics that they would like to present their hoped-for-possible selves rather than their "true" or "hidden selves".

It is predicted that users may characteristically emphasize or even exaggerate their identity with much emphasis on part of them that are socially desirable but not readily discernible in a brief encounter with other users, such as inner qualities including one's character and intelligence. At the same time, they could seek to downplay part of their identities that they feel are socially undesirable, such as for overweight, shyness, or stuttering.

Though it is possible for people to emphasize or deemphasize their identity to present the better side of themselves in offline conditions, Facebook offers a unique opportunity of constructing selective identities. This makes Facebook vastly different from internet dating because those on internet dating sites create a romantic relationship with people unknown to them, while those on Facebook concretizes friendships and romantic relationships among people known and unknown to them. Hence, Facebook is an ideal social media to predict how people will present themselves in terms of strength and weaknesses, what want others to feel about them to the end of leaving a lasting impression on the minds of other users.

Recently there has been much pressure on Facebook executives to review the privacy policy and make Facebook less anonymous. This is as a result of Facebook leaking users' data to Cambridge Analytical for influencing voters in several countries including Nigeria and the United States. At present, Facebook is in the process of revising its policies on privacy.

However, Roettgers (2018) and Oremus (2018), citing Egan (Facebook Chief Privacy Officer) and Beringer (Deputy General Counsel for Facebook), indicated that Facebook will not fundamentally change its stance on user's data rather they will render the policies in a language easier to read, spelling out the data they collect and how they use such data within their platform and with third parties. The two executives indicated that the revision is not yet finalized. Notwithstanding, it thus underscores the fact that the user's information is more anonymous than was previously thought. As a result, it is worth examining how users construct identities given the prevailing issues surrounding personal data on Facebook.

Literature Review

The advent of the internet has revolutionized the traditional conditions of predicting human characteristics or mode of constructing identities. With the inability of users to experience physical contact during the online encounter, it becomes possible for student A in Accra to interact with student B in Kumasi on the Facebook thinking he is communicating with a lady whereas offline (the real world) a young man is posing as a lady. Because of such tendencies, starting from the 1990's researchers have been conducting investigations into various possibilities and implication the internet would hold for the social conception of identity. Turkle (1995) for example investigated the potential for fragmented, multiple postmodern selves and arrived at the following submission: "computer-mediated communication can serve as a place for the construction of identity" (p. 14).

In his study, Hawisher (2004) examined feminist concepts such as affinity politics and oppositional consciousness through the idea of the Cyborg (a being with both organic and cybernetic parts) and sought to reject boundaries such as those between man and machine. In their studies, Zhao, Grasmuck, and Martin, 2008 indicated that due to the link between disembodiment and anonymity, social media creates a technologically mediated environment that paved way for the emergent new mode of identity production. Social media platform such as Facebook has unique features that allow people to "play-act at being someone else or to put on different online personae that differ from their ''real life" identities" (Zhao et al., 2008, p. 1818).

Since online users are aware of the fact that there is no physical contact between them and the other individual, they tend to hide their undesired physical characteristics and re-create their biography and personality. The user could pretend to be of another gender (a man may present himself as a woman), pretend to be an

extrovert while in the real world is an introvert. Research has shown that social media cannot reveal the inner qualities such as stuttering, shyness, or vindictiveness hence makes it possible for users with these traits or characteristics bypass the usual obstacles that prevent them from constructing desired identities in face-to-face settings (McKenna, Green, & Gleason, 2002). Findings of Suler (2002) and Rosenmann and Safir (2006) studies revealed that social networking sites are an ideal location for predicting human characteristics since it enhances users' ability to construct any type of identity that interests them and impresses their audience.

However, Zhao et al. (2008) indicated that the online world is not entirely anonymous. Family members, neighbours, colleagues, and other offline acquaintances also communicate with each other on the Internet. More importantly, most social networking sites, according to Roettgers (2018) and Oremus (2018) often have records of a person's legal name, residential location, and institutional affiliations and shares this information with third parties. This means users are fully aware that the social media sites are anonymous, hence they construct identities to heighten positive traits and downplay negative ones.

In their book: *Handbook of self-determination research,* Deci & Ryan (2017), sees self-determination theory as a macro theory of human motivation and personality, concerning people's inherent growth tendencies and their innate psychological needs. Essentially, self-determination theory addresses three universal needs: competence, autonomy and psychological relatedness. According to Deci & Ryan (p. 227), needs "specify the necessary conditions for psychological growth, integrity, and well-being." Relatedness, on the other hand, is about being connected to others by caring or being cared for (Wang et al., 2008). Competence is described as the effecting-focused ability to produce valued outcomes and experience mastery which in turn implies the desire for information-based learning, while autonomy refers to a person's volition – the desire to self-organize experience and to engage in activities that are in harmony with one's sense of the self (Deci & Ryan, 2012).

These three aspects of personality are invaluable to understanding what and why certain goals are pursued by actors in a social context. Motivation, according to Deci and Ryan, is very important because it lies at the bottom of the three characteristics mentioned earlier and it serves as the driving force for the three qualities, hence, there might be variation in what individuals need for competence, autonomy and relatedness.

As a result, it could be inferred that individuals are not simply passive and act only when they have to replenish perceived deficiencies of need fulfilment, but they also proactively and self-determinedly engage in activities that interest them and develop or actualize their potential. This is only possible as long as they are "in a context that allows needing satisfaction" (p. 230). This means that most activities people are interested in challenges their curiosity, openness and assimilation, culminating in positive resonance not necessarily because a need must be fulfilled but due to the mental exercise involved in such activities and the actualizing of their fantasies and innermost desires.

Deci & Ryan' study underpins the present study and sets the background for research domain: an empirical assessment of how quantitative data, or their change between two observation, may be perceived as effective reflective cues, about personal development in terms of satisfying intrinsic and higher-level needs, such as the need for relatedness, competence and autonomy which are often reflective in identity construction or self-representation on social networking sites such as Facebook. As a result, the present study shall unveil and discuss new dimensions in the performance and construction of identity by university students on the less anonymous online website – Facebook.

Methodology

The study is rooted in survey research paradigm. The choice of this research design was informed by its appropriateness and suitability. Mizner (2008) posited that survey research provides a high level of general capability in representing a large population. Due to the usual huge number of people who answers the survey, the data being gathered possess a better description of the relative characteristics of the general population involved in the study. As compared to other

methods of data gathering, surveys can extract data that are near to the exact attributes of the larger population. Moreover, Zhao et al (2008) and Ginger (2008) employed it in recent research similar to the present research with appreciable results.

Population and Sample

The population was made up of the all the first and third-year undergraduate students of the University of Ghana, Legon. The first-year students were selected by the researcher because they have less academic workload and under their level, the third-year students are not under much pressure academically like the second and final year students. The stated academic context of the first and third-year students allows them ample time to visit Facebook frequently. Using purposive sampling, a total of 240 undergraduate students was selected. The researcher employed purposive sampling because, the selection is by choice; the sample chosen is thought to be typical of the universe concerning the characteristics under investigation (Etikan, Musa, Alkassim, 2016).

The research site for the present study was the University of Ghana (UG). As Ghana's premier university, it was founded in 1948 as the University College of the Gold Coast-based on the recommendation of the Asquith Commission, on Higher education in the then British Colonies (Ofosu-Ampong, 2016; Ranking Web of Universities, 2018). The research site was selected due to its location and proximity. Located in Accra, the heart of Information Communication Technology in Ghana, social networking sites are popular among UG students (Kolan & Dzandza, 2018). Also, being a resident of Accra and within walking distance to the institution, data collection was relatively easy. Both factors (location and proximity) enriched the findings of the study.

Instrumentation

The major research instrument used was the questionnaire. Open-ended and closed-ended questions were used. Section C of the questionnaire contained structured questions based on a four Likert Scale where Always was 4, Sometimes 3, Rarely 2, and Never 1. The questionnaire was made up of three major sections. Section (a) consisted of items dealing with the frequency of users to Facebook, section (b) contained items designed to measure respondents' effort in updating their profiles on Facebook while section (c) looked into how people construct and perform identity on Facebook.

Data Collection Procedure

The researcher was assisted by some course representatives during the administration of the questionnaire, the main instrument for data collection. This was to promote participation and a high return rate of the questionnaires from respondents.

Results

The analysis was done concerning the stated research questions. First, to answer research questions 1 and 2, simple frequencies were run for section A and B of the questionnaire using percentages and tables. Second, an adequate answer was provided regarding question 3 by calculating the average-mean of responses about section C of the questionnaire. The aggregate conjecture of the data aided confirmation of predicted characteristics of Facebook users in the research site.

Analysis and Discussion

Identification of student's activity on Facebook is primarily important to deciphering how the type of trait or self-presentation they would construct on Facebook; this matter is treated in researcher question one (1).

Research Question One (1): How often do users visit Facebook? This question is meant to reveal how frequently and intensively Facebook users visit their profiles and make necessary contacts, conversation, and announcements. Table 1 provided an answer to the first research question.

Table 1 shows that the majority (48.3%) were visiting at least once to two times a day. This means that many students are digitally oriented and desired to make and retain friends on popular Facebook. Many though, (21.7%) visit the site three to four times daily, while only 6.7% visited the site three times a week and 3.3% less than once a week. These statistics suggest that participants log on

frequently, which logically parallels the frequency at which they could (and do) perform their self-presentation (identity)

Table 1. How often do you visit Facebook?

Activity	Count	Per cent
6+ times daily	36	15%
3-4 times daily	52	21.7%
1-2 times daily	116	48.3%
3 times a week	16	6.7%
1-2 times a week	12	5%
Less than once a week	8	3.3%

n=240
Source: Fieldwork (2018).

Research Question Two (2): How often do users update their profiles on Facebook? This question is intended to elicit information on the regularity or readiness of users to update their profiles on Facebook. Table 2 dwelt on this aspect of the study and results are presented below.

Table 2 below revealed that an overwhelming 124 (51.7%) of the respondents update their profiles once every few weeks. This means the majority of the respondents are not very eager to update their profile, perhaps they feel until something very important happen before they will update their profile. 32 (13.3%) update their profile every few days. 24 (10%) update their profile once a week. It is also noteworthy that 12 (5%) update their profile once a day. This means they are very frequent in updating their information, but they are few as compared to the total number of students' sample. Additionally, 48 (20%) are updating their profiles less than once a month. These are lagging, perhaps they are not digitally inclined or motivated or have fewer friends, hence they visit it once-in-a-while.

Table 2. How often do you update any aspect of your profile on Facebook

Activity	Count	Per cent
Once a day	12	5%
Once every few days (or more)	32	13.3%
Once a week	24	10%
Once every few weeks	124	51.7%
Less than once a month	48	20%
I don't update my profile	0	0

n=240
Source: Fieldwork (2018)

Table 3. When using Facebook, you

S/N	Items	Always	Sometimes	Rarely	Never	Mean (X)	Remark
1.	Investigate/view profiles or pictures	125	10	57	48	2.96	Popular
2.	Investigate/view groups or event	144	38	48	10	3.32	Popular
3.	Investigate/view notes or posted item	-	115	77	48	2.28	Unpopular
4.	View news feeds (personal or general)	173	19	10	38	3.36	Popular
5.	Search for people (profiles) or pictures	192		19	29	3.48	Popular

6.	Search for groups or events		29	154	57	1.88	Unpopular
7.	Check, reply to, or send messages	192		19	29	3.48	Popular
8.	Read all posts	173	38	10	19	3.52	Popular
9.	Make or respond to wall posts	192		10	38	3.44	Popular
10.	Poke others (initiate)	10		221	9	2.04	Unpopular
11.	Return pokes (reciprocate)	150	38	9	43	3.23	Popular
12.	Create groups	-	115	77	48	2.28	Unpopular
13.	Create events	5	4	185	46	1.87	Unpopular
14.	Post pictures	182	29	19	10	3.60	Popular
15.	Check out advertisements	10		221	9	2.04	Unpopular

n=240
Source: Fieldwork (2018)

Research Question three (3): How do users construct and perform their identity on Facebook?

The study revealed that users are logging in often, and updating their profiles semi-frequently, but what are they doing when they log in, i.e how do they go about negotiating their identity on Facebook. Section C of the questionnaire contained questions to gauge student usage tendencies. These behaviours give one measure of how information might be exchanged in ways that construct or perform identity. By assigning a value of 4, 3, 2, and 1 to the four-point Likert scale allow for easy identification of popular or unpopular used items. Using 2.50 as the cut-off point to determine popular and unpopular items, then, frequently used or the popular item is represented by items with mean value higher than 2.50 while items with the mean value of responses lower than the 2.50 are indicative of unpopular item, 2.50, therefore, represent the neutral item. Responses of the students are given in Table 3 above: A closer look at Table 3 revealed that most activities have stayed at approximately the same level of popularity for respondents. The only significant exception might be posting of pictures, followed by wall actions and reciprocating pokes, which seem to have become more popular, 3.60 (posting pictures), 3.52 (read wall post). Picture and Wall posting is an interesting method of expression on the Facebook network. When user post to another's the wall they are not just simply messaging or communicating with one another, but doing so in a semi-public fashion, making it a distinctly different kind of performance-based activity. The act of posting to another's wall is the only one that is (potentially) picked up by the newsfeed and easily visible to the general public (people who visit your profile).

Apart from wall actions, the remaining common usages in Table 3 were covert ones: investigate/view profiles and pictures, reading wall posts and messages, and following the newsfeed. Posting pictures and returning pokes are the only two occasional activities that are unconcealed. The remaining actions users sometimes take when logged on are hidden: Sending messages, searching for friends, and investigating or viewing groups and events. Table 3 also revealed that the most popular behaviours are those related to both direct and indirect communication and information exchange.

Direct and purposed construction of identity (on-stage) comes in the form of 'public' actions such as profile updates, posting of pictures, and wall messages as well as hidden reciprocating actions (back-stage) like messaging and poking communications. Implicit influences on identity construction are carried out by the searching and investigating of profiles and pictures, distanced observations of walls, groups, events, and newsfeeds, and potentially read but unanswered messages (off-stage). Participants know others are looking at their profiles and watching the newsfeed and thus situate them in a context suited to their audience, allowing for a blend of influence strategies (impression management) Pictures are often one of the driving features behind the whole economy of profile exchange.

The ties between the physical and online worlds facilitate a stronger representation of identity and help to combat feelings of

disembodiment. Sharing through pictures may be less assertive. However, as viewing a picture does not notify the owner of the picture that someone is looking at it, users seem to browse (investigate) more than they actively and intentionally search for specific people, groups, and events in the system. The newsfeed, however, offers an interesting mixture of potentially passive observation and indications of assertive characteristic or behaviour. Some items, like the breakup of a romantic relationship, group and application involvement, and status changes are also tagged by the newsfeed but were not included above in the collection of widespread routines.

Significantly, Table 3 indicates that the newsfeed 3.36 (popular) has become viable, or at least, accepted way of sharing one's activities, constructing identity information, and otherwise communicating indirectly (and potentially unintentionally) with the mass. While some users may not purposely act to perform for the newsfeed, they at least know that it's observing them. The fact that far fewer people initiate pokes 2.04 (unpopular) than return them probably indicates fewer poke starters than people willing to engage in poke-exchanges.

The most assertive activities, such as creating events, groups, and poking others as well as the ones least directly connected to people, such as viewing groups, events, the pulse, and posted items, were the ones of lowest occurrence. Advertisements 2.04 (unpopular) were one of the least often engaged items on Table 3, which is perhaps not surprising, but unfortunate news for marketing agents who feel Facebook is the best place to get their product to take off.

Ginger (2008) and Compete.com (cited by Freiert, 2007) also conducted similar studies to determine what Facebook visitors were doing most on the website. Their findings are consistent with those explained here though they sourced data via a different method. For example, Compete.com tracked only behaviour, wall posting was not examined. Their study was not user-reported or empirical data but instead collected data by analysis of system statistics. Unlike this study, Compete's results ranked browsing of profiles as the most frequent activity, followed by browsing pictures and interacting with applications. Ginger, on the other hand, studied the differences between users based on the number of friends on other networks and also analyzed the demographics of participants.

Findings

The major findings emanating from the research include the following:

i. It was discovered that Facebook subscribers have many opportunities to perform their identity on Facebook, hence several students investigated are frequently (Table 1, item 3 (48.3%) visiting the site once or two times a day for connections, making and retaining friends and the likes.
ii. The investigative study also revealed on Table 2, item 4 that majority (124 (51.7%)) of the respondents are updating their profiles once every few weeks, this means they are semi-frequent in updating their profiles. This may also suggest that are very actively involved or passive about such matters but are rather interested in checking postings or events on the site.
iii. The study also revealed that majority of the respondents is highly interested in posting pictures (3.60) followed by wall posting (3.52) as depicted in Table 3, item 8 and 14. These are veritable means of constructing and performing individual identities on Facebook.

Conclusions

Given the findings emanating from this study, the following conclusions were drawn:

a. In line with the analysis presented above, the majority of the students showcased themselves indirectly through photo and wall posting on Facebook. In this way, it was shown that most of the respondents display mediated interaction due to being online and expected their audience to respond alike. Respondent tailored their characteristics or identity towards wanting their audience like them, to be desired by their girlfriend and sought after by popular users.
b. The study also showed that the virtual (online) world is not a dreamland for deviant behaviour. As it is expected of an individual to behave according to established norms; conformity to norms will be rewarded and deviations from them will be punished. On the Facebook environment, individuals can be held accountable for deviant behaviours,

hence users maintained adorable personality or identity, in harmony with normative expectations.

c. It was also seen that several users downplay unfavourable characteristics while highlighting positive ones.

Recommendations

Based on the findings and the conclusions enumerated above regarding the construction and performance of identity on Facebook, the researcher made the following recommendations:

1. All users of the Facebook network should be wary in their approach to matters on the website because Facebook allows subscribers to partition their Facebook pages into many "back" and "Front" regions in this case staging different identity shows for different audiences. One should not be deceived into believing what may later hurt him physically and otherwise.
2. Also, because of the recent development regarding a privacy issue, it is recommended that Facebook should refrain from technical approach to seeking the consent of users, of which, on several occasions, they are not aware of how their personal information is being used. Facebook executives should be transparent and revise their privacy policy to facilitate users' informed decision.

References

[1] Banks, A. (2006). *Race, Rhetoric, and Technology: Searching for Higher Ground*. Mahwah, CT: Lawrence Erlbaum Associates.

[2] Bargh, J. A., McKenna, K. Y. A., & Fitzsimons, G. M. (2002). Can you see the real me?

[3] Activation and expression of the ''true self'' on the Internet. *Journal of Social Issues, 58(1), 33–48.*

[4] Boyd, D. M. and N.B. Ellison (2007) 'Social Network Sites: Definition, History and Scholarship', *Journal of Computer-Mediated Communication 13(1).*

[5] Brennan, G., & Pettit, P. (2004). Esteem, identifiability and the Internet. *Analyse & Kritik, 26, 139–157.*

[6] Cassidy, J. (2006). Me media. The New Yorker (May 15), 50–59.

[7] Clark, L. S. (1998). Dating on the Net: Teens and the rise of "pure relationships". In S. G. Jones (Ed.), *Cyberspace 2.0: Revisiting computer-mediated communication and community* (pp. 159–183). Thousand Oaks, CA: Sage.

[8] Douglas, K. M., & McGarty, C. (2001). Identifiability and self-presentation: Computer-mediated communication and intergroup interaction. *British Journal of Social Psychology, 40, 399–416.*

[9] Ellison, N., Heino, R., & Gibbs, J. (2006). Managing impressions online: Self-presentation processes in the online dating environment. *Journal of Computer-Mediated Communication, 11(2) (article 2).*

[10] Ellison, N.B., C. Steinfield and C. Lampe (2007) 'The Benefits of Facebook 'Friends:' Social Capital and College Students' Use of Online Social Network Sites', *Journal of Computer-Mediated Communication 12(4).*

[11] Etikan, I., Musa, S. A., Alkassim, R. S. (2018). Comparison of Convenience Sampling and Purposive Sampling. American Journal of Theoretical and Applied Statistics. Vol. 5, No. 1, 2016, pp. 1-4. doi: 10.11648/j.ajtas.20160501.11

[12] Freiert, M. (2007). "Facebook now ranked 3rd in Page Views; MySpace down nearly 20%." *Compete.com.* September 11.

[13] Gibbs, J. L., Ellison, N. B., & Heino, R. D. (2006). Self-presentation in online personals: The role of anticipated future interaction, self-disclosure, and perceived success in Internet dating. *Communication Research, 33(2), 152–177.*

[14] Ginger, J. (2008) (2nd Ed.) Performance and Construction of digital identity. The FacebookProject.com. *(http://www.thefacebookproject.com/research/jeff/publications/genderroles.html)*

[15] Girard, R. (1961). *Deceit, desire, and the novel: Self and other in literary structure*. Baltimore: John Hopkins Press.

[16] Goffman, E. (1959). *The presentation of self in everyday life.* New York: Doubleday.

[17] Goffman, E. (1963). *Behaviour in public places.* New York: The Free Press.

[18] Hawisher, G. E., Cynthia L. S., Brittney Moraski, and Pearson, M. 2004. "Becoming Literate in the Information Age: Cultural Ecologies and the Literacies of Technology." *College Composition and Communication 55:642-92.*

[19] Higgins, E. T. (1987). Self-discrepancy theory. *Psychological Review, 94, 1120–1134.*

[20] Kolan, B. J., & Dzandza, P. E. (2018). Effect of social media on the academic performance of students in Ghanaian universities: a case of the University of Ghana, Legon. Library Philosophy and Practice (e-journal). 1637, pp. 1-24.

[21] Markus, H., & Nurius, P. (1986). Possible selves. American Psychologist, 41(9), 954–969.
[22] Marx, G. T. (1999). What's in a name? Some reflections on the sociology of anonymity. *The Information Society, 15, 99–112.*
[23] McKenna, K. Y. A., Green, A. S., and Gleason, M. E. J. (2002). Relationship formation on the Internet: What's the big attraction? Journal of Social Issues, 58(1), 9–31.
[24] Ofosu-Ampong, K. (2016). The uptake of the institutional repository: the case of the University of Ghana. Unpublished thesis submitted to the University of Ghana.
[25] Oremus, W. (2018). Facebook is passing the Buck.
https://slate.com/technology/2018/03/Facebook-responds-to-Cambridge-Analytica-scandal-says-its-outraged-that-we-were-deceived.html . Retrieved June 4, 2018.
[26] Porter, C. E. & Donthu, N. (2006). "Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived barriers and demographics." Journal of Business Research 59:999-1007
[27] Perez-Torres, V., Pastor-Ruiz, Y., & Ben-Boubaker, A. (2018). You Tubers videos and the construction of adolescent identity. Communicator, Vol. 26, No. 55, pp. 61-70.
[28] Ranking Web of Universities (2018). Retrieved June 3, 2018, from http://www.webometrics.info/en/Africa/ghana
[29] Roettgers, J. (2018). Facebook admits to scanning private messages, releases privacy policy updates.
https://variety.com/2018/digital/news/facebook-policy-updates-1202743819/. Retrieved June 4, 2018.
[30] Rosenberg, M. (1986). Conceiving the self-Malabar, FL: Robert E. Krieger. Rosenmann, A., and Safir, M. P. (2006). Forced online: Push factors of Internet sexuality: A preliminary study of online paraphilic empowerment. *Journal of Homosexuality, 51(3), 71–92.*
[31] Stone, G. (1981). Appearance and the self: A slightly revised version. In G. Stone and H. A. Farberman (Eds), *Social psychology through symbolic interaction* (2nd ed., pp. 187– 202). New York: Wiley.
[32] Stone, A. A. (1996). *The war of desire and technology at the close of the mechanical age.* Cambridge, MA: MIT Press.
[33] Stutzman, F. (2008). Data Portability. " *Unit Structures*. July 2.
[34] Suler, J. R. (2002). Identity management in cyberspace. *Journal of Applied Psychoanalytic Studies, 4(4), 455–459.*
[35] Surratt, C. G. (1998). Netlife: Internet citizens and their communities. New York: Nova Science.
[36] Turkle, S. (1995). *Life on the screen: Identity in the age of the Internet*. New York: Simon and Schuster.
[37] *Twumasi, P. A. (1986) Social Research in Rural Communities: the problems of fieldwork in Ghana.* Accra, Ghana Universities Press*Pp. 109.
[38] Walker, K. (2000). ''It's difficult to hide it": The presentation of self on Internet home pages. *Qualitative Sociology, 23(1), 99–120.*
[39] Yurchisin, J., Watchravesringkan, K., & McCabe, D. B. (2005). An exploration of identity re-creation in the context of Internet dating. *Social Behavior and Personality, 33(8), 735–750.*
[40] Zacarés G. J., Iborra, C. A., Tomás, M. J., & Serra, D. E. (2009). Identity development in the adolescence and emergent adulthood: a comparison of global identity versus identity in specific domains. Anales De PsicologíA / Annals of Psychology, 25(2), 316-329. Retrieved from http://revistas.um.es/analesps/article/view/87931/84641
[41] Zhao, S. (2006). Cyber-gathering places and online-embedded relationships. *In Paper presented at the annual meetings of the eastern sociological society in Boston.*
[42] Zhao, S., Grasmuch, S., and Martin J. (2008) Identity construction on Facebook: Digital empowerment in anchored relationships. *Computers in Human Behaviour, pp. 1816 – 1836.*



ejournal.assist@tau.edu.gy
www.texilajournal.com