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Effect of Health Workers Strikes on Quality of Care in Health Institution in Cross River State, Nigeria

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Abstract

The focus of this study is to examine the effect of labour strikes on patient's quality of care in health facilities. However, the objective can be achieved by answering the research question which is "does labour strike affects quality of care in health institutions? The study is a cross-sectional descriptive study of 508 respondents from the outpatient, laboratory and pharmacy departments, Ante-Natal, Post-Natal and ART clinics of the 7 secondary health institutions spread across 3 senatorial districts in the state between January and February 2018 using multistage method. Data were collected using a semi structured closed- and open-ended questionnaire divided into different sections. Raw data were entered EpiData™ and exported for analysis using the SPSS software version 20. The data were cleaned and validated for use. Frequency tables were produced and associations between categorical variables were determined using chi squared test at a significance level of P<0.05.

The negative effects of strikes are highly felt generally among all patients with no statistical significant difference whether employed, unemployed or retired (P>0.05). However, the significant effect of health workers' strike on quality of care is that strikes increases death rates. The result showed that regardless of patient's education level, patients are fully aware that one of the effects of health worker strikes is increase in death rate with P value >0.05. Labour strike also increases misuse of drugs, expiry and wastages of drugs and laboratory reagents. In conclusion, the higher the level of education, the higher the awareness that labour strikes affect the duty of health workers and have effect on patient's attendance, poor healthcare indicators and cause patients' dissatisfaction.

Keywords: *Health Workers Strikes, Quality of Care, Patient Satisfaction and Secondary Health Institutions.*

Introduction

In enhancing national growth, organizations have several roles to play. Dispute tends to set in, in attainment of these organizational roles. Dispute can be defined as a state of disharmony that could be brought about by differences of impulses, desires, opinion or tendencies. It can be brought about because of an argument or disagreement with a co-worker (Adeyemi, 2009) or among the staff of an organization. Disputes are bound to occur between employers and employees. Such disputes have the potentials of affecting the confidence entrenched in worker-employer's relationship, productivity and client's satisfaction

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A strategy used by a group of employees is strikesto force the employer to meet their demands. Strikes thus are discussed in terms of the economic nature of the events. Employees and employers can be pressurized to settle strike by a third-party involvement. In Nigeria, the frequency of strike declared by different unions or associations comprising Physicians, Pharmacists, Medical laboratory Scientists, Nurses etc. are alarming and disturbing to the system and the country at large. In the event of a health care workers (HCW) strike, the impact may extend beyond the economic increases in the rates of morbidity and mortality. The misalignment of health care resources which also include health commodities (HC) like pharmaceutical drugs, laboratory reagents and other health commodities together with expenditures caused by unnecessary hospitalizations or by retention of patients in care are all due to effect/impacts of frequent strike of HCWs.

The Nigerian health sector was characterized by frequent strikes which lingered for long, in some cases because of non-caring attitude on the part of stakeholders involved. The spread of the recent cholera outbreak in some parts of Nigeria could have been averted if physicians and other medical workers were not on strike and responded appropriately to the management of the epidemics (Chima, 2010). The most significant aspect of industrial conflict is strike which is the temporary stoppage of work in the pursuance of grievance or demand. However, in practice other forms of expression of industrial dispute is difficult to separate from strike as workers embark on strike action and employers also lock out workers from their duty post. It is important to see both phenomena as part and parcel of the conflict situation and not as opposite, as strike rarely occur over a single issue but actual cause may be linked with several other issues. These issues may be unconnected to the observation that have being the cause of dissatisfaction because there have been no solutions to them. The actual causes of strike depend on so many factors which include unresolved negotiation and disagreements between the workers and the employers, government failure to meet up with health workers demand and superiority complex among health workers etc. This indicated that not many of those strikes occur spontaneously especially as there is no certainty of that strike actions instead of the other type of industrial action that workers may decide.

Drugs that are life-saving such as anti-retroviral therapy and other critical supplies are becoming more accessible to millions of people living with HIV/AIDs. The modern pharmaceutical and laboratory commodity supply and management chain is complex and ravaged with numerous challenges among which include frequent strikes by the health worker that has led to wastages of health commodities in all our facilities.

Nigeria health care sector has been affected by series of strikes and near misses of strike. However, since 1999 till date, health care workers all over the country have embarked on or threatened various forms of industrial action. The disputes have lasted for over a month or more in some cases while health care system was left in disarray. In a situation where the health care industrial disputes simultaneously and frequently occurred in various parts of the state, these disputes would then be seen by all as a symptom of a national crisis of epic proportions – health care employment crisis (Otobo 2005).

It has been said that to disallow any group of workers, including “workers on essential services” the right to strike amounts to enslavement which is indefensible ethically and morally (Rennie, 2009). While medical strikes occur globally, the effect and subsequent outcome are apparently more severe in poorer socio-economic developing countries like Nigeria which is embedded by infrastructural deficiencies, and absence of viable alternative means of obtaining healthcare services

Strikes occur globally but the effect in developing countries is more severe as there are other issues that compound the effects such as unavailability of alternative health care, poor socio-economic circumstances and poor infrastructures. Strikes also have a negative impact on the quality of health care service delivery in most countries as eventually striking health workers may relocate their services leaving a vacuum for a while. (Osakede, 2014)

Strike entails withdrawing services by workers (in any sector) in a democratic state to achieve goals in the workplace. Generally, strike is the last resort to solving industrial problems and occurs when the collective bargaining process collapses and the unions are dissatisfied with management’s offer to rectify the situation (Fashoyin, 2008).

Methodology

Health care service in **Cross River State** is tiered into: Primary, Secondary and Tertiary. The State has 1114 primary health centers, 12 General Hospitals and 1 tertiary health institution. A cross-sectional descriptive survey approach was used to execute this study between January and February 2018. A pretested semi structured questionnaire with both closed- and open-ended questions was used to collect data for this study. Multistage sampling technique was employed in selecting 508 respondents. In stage one, 2 out of the 3 senatorial districts were selected by simple random sampling employing simple ballot in the two selected geopolitical zones. In stage two, 7 out of 9 secondary health facilities were selected from the 2 senatorial districts (Southern and Northern senatorial districts) by simple random sampling. In Stage three, questionnaires were distributed systematically to patients attending the following service delivery points: outpatient department, laboratory department, pharmacy department and ART clinic based on their client load. These were consenting patients above 18 years old attending the outpatient, laboratory and pharmacy departments, Ante-Natal, Post-Natal and ART clinics of the 7 secondary health institutions spread across 3 senatorial districts in the Cross-River state, Nigeria, between January and February 2018. Data collected were cleaned and validated for use. Simple frequency tables were produced and associations between categorical variables were determined using Chi square test at a significance level of $P<0.05$. Age, Gender, educational qualification, occupation and attendance at the facility were re-coded for the Chi-square analysis. Recoding of variables saw all participants grouped into male and female, graduates and non-graduates, married and single (with widows classified as singles) and attendance at the facility grouped into <1 year, 1- 5 years, 6 -10 years, 11 – 15 years and > 15 years.

Result

Table 1. Demographic

Parameter	Frequency	Percentage
Gender		
Male	265	52.2
Female	243	47.8
Marital status		
Single	248	48.8
Married	260	51.2
Religion		
Christianity	446	87.8
Islam	49	9.6
Traditional	13	2.6
Level of education		
No formal education	83	16.3
Non-graduate	220	43.3
Graduate	205	40.4
Employment status		
Unemployed	142	28.0
Employed	153	30.1
Self employed	199	39.2
Retired	14	2.7

There were 265 (52.2%) males and 243 (47.8%) females with male: female ratio of 1.1:1. 466 (87.8%) were Christians, 49 (9.6%) Muslims and 13 (2.3%) were traditional religion worshippers. 83 (16.3%) of the respondents have no formal education, 220 (43.3%) were educated but non-graduates

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while 205 (40.4%) were University or college graduates. Most of the respondents, 199 (39.2%) are self-employed followed by 153 (30.1%) who are gainfully employed while 142 (28.0%) and 14 (2.7%) are unemployed and retired respectively.

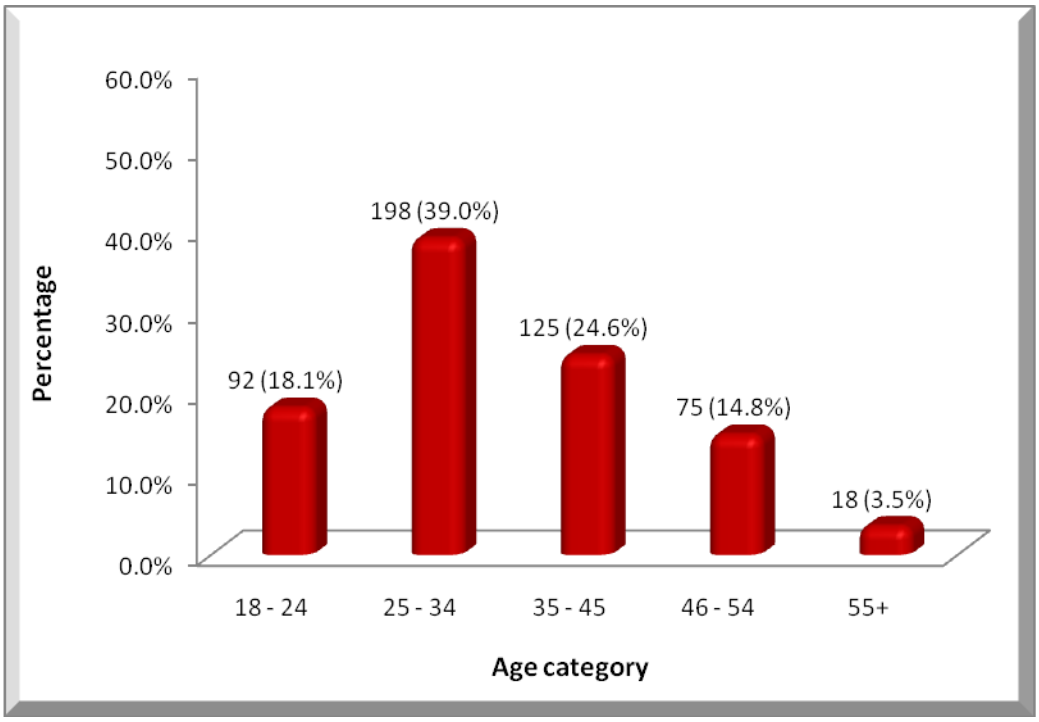

Figure 2. Age category of respondents

The age range of most repondents was 25 - 45 with the peak value of 198 (39%) recorded for age group 25 – 34 years followed by 125 (24.6%) for 35 – 45, 92 (18.1%) was seen for 18 – 24 years, 75 (14.8%) for 46 – 54 while the least value of 18 (3.5%) was seen for 55 years and above age group.

Table 2. Effects of strike on quality of care in health facilities

Parameter	**Agree**	**Disagree**	**Not Sure**
Strikes cause poor healthcare quality, increase cost; it leads to loss of lives, loss of time, and loss of public confidence, low staff morale and also results in wastage of our limited resources	450 (88.6%)	16 (3.1%)	42 (8.3%)
Strikes affect the duty of health workers and have effect on patient's attendance, poor performance of healthcare and patient not satisfy	447 (88.0%)	14 (2.8%)	47 (9.3%)
Strikes discourage adherence to drugs and lead to high rate of referrals to private hospitals	420 (82.7%)	27 (5.3%)	61 (12.0%)
Strikes increase death rate	421 (82.9%)	28 (5.5%)	59 (11.6%)
Strikes have negative effect on you and your family	433 (85.2%	32 (6.3%)	43 (8.5%)
Strike i**ncreases misuse of drugs, expiry and wastages of drugs and** lab reagents	344 (67.7%)	52 (10.2%)	112 (22.0%)
Patients are not happy during strikes	468 (92.1%)	13 (2.6%)	27 (5.3%)

(P = 0.000)

Most of the respondents (450; 88.6%) agreed that health workers' strikes cause poor healthcare quality, increase cost and lead to loss of lives, loss of time, and loss of public confidence, low staff

morale and also results in wastage of our limited resources, 16 (3.1%) disagreed while 42 (8.3%) were also unsure. Likewise, 447 (88.0%) agreed that labour strikes affect the duty of health workers and have negative effects on patient's attendance, poor performance of healthcare and patient's dissatisfaction, 14 (2.8%) disagreed while 47 (9.3%) were unsure. Most respondents (420; 82.7%) agreed that labour strikes discourage adherence to drugs and lead to high rate of referrals to private hospitals, 27 (5.3%) disagreed while 61 (12.0%) were not sure. Also, 421 (82.9%) percent agreed that labour strikes increase death rates, 28 (5.5%) disagreed while 59 (11.6%) were not sure. Majority, 433 (85.2%) agreed that labour strikes have negative effects on them and their families, 32 (6.3%) disagreed while 43 (8.5%) were unsure. In similar manner, 344 (67.7%) agreed that labour strikes increase misuse of drugs and laboratory reagents, 52 (10.2%) disagreed while 112 (22.0%) were not sure. Over ninety percent (468; 92.1%) agreed that patients are not happy during strikes, just 13 (2.6%) disagreed while 27 (5.3%) were unsure (Table 4). The chi-square P value <0.05 shows that labour strikes negatively affects health care quality in contrast to the assumption that strikes have no effect on health care quality (Table 2).

Table 3. Effect of strike on patients

Parameter	Yes	No
Do you go to private hospital during strikes?	384 (75.6%)	124 (24.4%)
Do you spend more money?	375 (73.8%)	133 (26.2%)
Do you agree that there is disruption in patients care?	339 (66.7%)	169 (33.3%)
Do you agree that there is high rate of referral of patients to private hospitals during strike?	397 (78.1%)	111 (21.9%)

(P = 0.000)

Majority of respondents (384; 75.6%) do go to private hospitals for treatment during strikes while only 124 (24.4%) do not. Also, 374 (73.8%) spend more money on hospital bills during strike while 133 (26.2%) do not. Over sixty six percent (399; 66.7%) stated that there is disruption in patients' care during strike and 397 (78.1%) cited high rate of referral during strikes as another effect of strikes on the quality of health care (Table 3).

Table 4. Effect of labour strike on gender

Strikes have negative effect on you and your family	Gender (%)	
	Male	Female
Agree	228 (86.0%)	205 (84.4%)
Disagree	19 (7.2%)	13 (5.3%)
Not sure	18 (6.8%)	25 (10.3%)
Total	**265 (100.0%)**	**243 (100.0%)**
X^2 2.583, P value 0.281		

Majority of the male respondents (228; 86.0%) agreed that strikes have negative effects on them and their families while 19 (7.2%) disagreed. Similarly, 205 (84.4%) females agreed that strikes have negative effects on them and their families while 13 (5.3%) disagreed. The P value >0.05 shows that strikes equally affect male and female patients (Table 4).

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Table 5. Effect of strike on employment status of respondents

	(%)			
	Unemploye	**Employed**	**Self-employed**	**Retired**
Do you spend more money in the clinic during strike?				
Yes	102 (71.8%)	116 (75.8%)	145 (72.9%)	12 (85.7%)
No	40 (28.2%)	37 (24.2%)	54 (27.1%)	2 (14.3%)
Total	**142 (100.0%)**	**153 (100.0%)**	**199 (100.0%)**	**14 (100.0%)**
X^2 1.732, P value 0.631				
Strikes have negative effect on you and your family				
Agree	116 (81.7%)	128 (83.7%)	175 (87.9%)	14 (100.0%)
Disagree	11 (7.7%)	11 (7.2%)	10 (5.0%)	-
Not sure	15 (10.6%)	14 (9.2%)	14 (7.0%)	-
Total	142 (100.0%)	153 (100.0%)	199 (100.0%)	14 (100.0%)
X^2 5.332, P value 0.503				

Approximately seventy two percent of the unemployed respondents spend more money on treatment in private clinics during strikes (102; 71.8%), 75.8% of the employed spend more, 72.9% for the self-employed while the highest percentage, 85.7% was seen. Majority, 81.7% of the unemployed agreed that abour strikes have negative effects on them and their families, 7.7 disagreed while 10.6% were not sure. Similarly, 83.7% of the employed agreed, 7.2% disagreed while 9.2% were unsure. For the self-employed, 87.9% agreed to negative effects of strikes on them and their families, 5.0% disagreed while 7.0% were also unsure. All the retired, 100.0% agreed that labour strikes have negative effects on them and their families (Table 5). However, the values of $P>0.05$ show that there is no significant difference in the effect of strikes on employment status i.e., strikes negatively affect both employed and unemployed equally.

Discussion

Patient quality of care is also an indicator for performance management, it is a very important tool in processing monitoring and improving patient satisfaction. Assesses what patient think about the care and treatment they have received present one approach to improve the quality of care (Donabedian, 1988). The effect of strikes on quality of care on patients from this study could be supported by other similar studies, famous among them was consequences of healthcare workers' strikes in the United States in the 1970s, which was documented by Wolfe in an editorial in the American Journal of Public Health in 1979 which include loss of revenue to the hospital and increasing death of patients on transit as patients are transferred from one health facility to another Wolfe, (1979). Ogunbanjo et al, (2009) in his study identified two classes of effects/impact of strike actions on patients and health care workers thus for patients, loss of job if employed, transportation cost, delays in treatment, suffering due to prolong medication, irreversible damage to health, dangerous drugs interactions and death are recorded while on the part of the workers financial enhancement and improved working conditions which contribute to less emotional pressure are the gain of healthcare workers. Milutinovic et al (2010) emphases that satisfied patients adhere strictly to the advice of healthcare practitioners, their hospitalization period is shorter, and thus expenses of the healthcare are lower. The findings in this study supported the earlier studies in the sense that 86.9% of respondents agreed that labour strikes causes poor healthcare quality, increase cost; it leads to loss of lives, loss of time, and loss of public confidence, low staff morale and results in wastage of our limited resources while 88.0% of respondents also agreed that labour strikes affect the duty of health

workers and have effect on patient's attendance, poor performance of healthcare and invariably lead to patients dissatisfaction. This shows that effects/impacts of labour strikes are favourably skewed towards healthcare workers since government will still pay for the number of days the workers remain on strike. The participants thus agreed from the study that labour strikes have negative effect generally on patients and their family.

The study also revealed that strikes affect health commodities security leading to expiry/waste of drugs and laboratory reagents and loss of revenue. It is a known fact that strike and warning strike in Nigeria can last from days to months depending on the issues at hand which might be due to one problem or the other. However, health commodities (HC) like drugs and laboratory reagents which include cold and non-cold chain reagents and some nutritional supplements like soya plus will be greatly affected which might result in expiry or damage of some these commodities, loss of potency of some laboratory reagents and compromise of cool and cold chain reagents. Hence labour strike might be said to compromise health system in Nigeria as physicians and other healthcare professionals are disconnected from their primary assignment in providing health care services leading to poor healthcare quality. Quality of care is, without a doubt one of the essential ingredients of the healthcare services. Offei (2012) emphasized that poor healthcare quality is costly; it leads to loss of lives, loss of time, and loss of public confidence, low staff morale and results in wastage of our limited resources.

In a situation that health care services are compromised then the efforts to influence determinants of health will not include more direct health-improving activities such as six aims for the health care system (Crossing the Quality Chasm, 2011). Therefore, the purpose of HSS in setting out the entire health systems agenda might have been defeated. According to Weisman and Koch (1989), satisfied patients are more likely to seek health care and to comply with prescribed treatment regimes. Also, satisfied patients are more likely to develop a deeper and longer lasting relationship with their medical provider leading to improved compliance, continuity of care and lastly better health outcome (Larsen, 1976 and Pascoe, 1983); however, this study revealed that labour strikes discourage adherence to drugs and lead to high rate of referrals to private hospitals meaning that there is poor retention of patients in care, increase in resistant strains of organisms, prolong treatment and medication, low yield and low returns on investment. Patients are seen to largely bears the brunt of this managerial inadequacy; as they are forced to procure drugs of doubtful quality from patent medicine shops outside the health facilities Iliyasu, (2010) or patronize ill equipped laboratories, since a well-functioning logistic system are disrupted during labour strikes thereby hampering an improve quality of care and reduced cost effectiveness and efficiency USAID, (2011). This study focused mainly on secondary health institutions in Cross River State which is not enough to generalize it to Nigeria. Subsequent study will need to focus on the whole health institution in Nigeria which include primary health care and tertiary health institution.

Conclusion

In line with Adebimpe, (2010) conclusion, it can be deduced that health workers' strike have more adverse than positive effects, and labour strikes should be prevented in dispute resolution in the healthcare system, as it is still very common in health sector in Nigeria. Healthcare workers/union should work to minimize strike actions while building health leadership that will lead to the development of world-class best practices in the Nigerian health industry (Iliyasu, 2010). In conclusion, the higher the level of education, the higher the awareness that labour strikes affect the duty of health workers and have effect on patient's attendance, poor healthcare indicators and cause patients' dissatisfaction.

Recommendations

It is true that there is likelihood of disagreement in an organization but are labour strikes the solution or panacea to such disagreement? A strike by health workers, including doctors, always has an impact on the lives of the people because it affects their health. In fact, it is a matter of life and death. It is clear as it is revealed from the study that strike actions are not the solution to the problem.

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Hence the respondents proffer some recommendations that will reduce the effect that labour strikes dissatisfaction causes on patients attending health institutions.

- Government should take step to resolve crisis and negotiate with the health workers union timely and should not enter into agreement that cannot behonour, as it is fond of doing because it usually backfires.
- Government should take steps to see that basic services are in place and emergency teams are working throughout the duration of labour strike.
- All health workers should work together in harmony and respect each other, learn to relate or coexist with one another peacefully without interference.
- Healthcare management training for leaders in health institution must be in place to develop the skill in Leadership and Management in Health.
- Joining trade Unions should not be made compulsory for healthcare workers as it is the practice now.
- Healthcare/hospital workers should be restricted/ban from going on strike as the job of doctors and other health workers are thought to be driven by compassion and in providing quality health care for the people thus they are expected to make sacrifices in their job
- Government should develop standard operating procedure for managing strike.
- Multi Month Prescribing (Multi Scripting) Model of dispensing of drugs should be adopted when there is impending strike action in all the health facilities especially for patients on Ante-retroviral drugs and opportunistic infections, Tuberculosis, Diabetics, hypertensive case and other chronic diseases.

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Job Satisfaction and Organizational Productivity in the Nigerian Civil Service

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Abstract

The main aim of the research topic; Job satisfaction and Organizational productivity in the Nigerian civil service is to determine the relationship between employee satisfaction, organizational performance and the effect of reward. The research work made use of research questionnaire to elicit vital information on job satisfaction and organizational productivity; the method of Chi-square and Pearson correlation method were used for the purpose of the analysis; Notably, the growth of an organization is dependent on the level of employee's satisfaction. The researcher concluded that there is a significantly strong relationship between employee satisfaction and organizational performance. It is pertinent to emphasis that a worker's reaction at work helps to determine the output level of the organization. This is why the researcher spent time to study the extent of organizational productivity vis-à-vis the satisfaction derived by workers on the Job. When a worker gets satisfied, his effort/input will increase which ordinarily and most likely lead to the increase in the organizational output- Hence the need to concentrate on the motivational factors, which enhances the output of organization. The study revealed those motivational factors analyzed them and made some recommendation which if implemented rightly, will improve the condition of worker and enhance increase in organizational productivity in Nigeria.

Keywords: *Employee satisfaction, Organizational performance, employee productivity, reward.*

Introduction

The Nigerian Civil Service is an organ of administrative bureaucracy which plays an important role in the execution of government policy. Worldwide, the contributions of Civil Service in promoting sustainable and equitable economic growth cannot be over emphasized. Efficient and effective organizational productivity of the Civil Service are critical to sustainable socio-economic development of any nation.

Civil Service is defined as *neither political nor judicial by* The New Encyclopedia Britannica, (2004).

(Bezzina, 1994) opined that: *Civil Service refers to employees selected and promoted on the basis of a merit and seniority system, which may include examination.* The World Book Encyclopedia, (2004), noted that: *The Civil Service consists of people employed by the state to run the public service of a country.* (Abba and Anazodo, 2006) noted that: *Civil service in Nigeria comprises workers in the various ministries or departments apart from those who hold political appointments.*

The Nigerian Civil Service consists of employees in Nigerian government agencies (other) than the military and police. Most employees are career civil servants in the Nigerian ministries, progressing based on qualifications and seniority. The Nigerian Civil Service has its origins in organizations established by the British in colonial times. Since Nigeria gained full independence in October 1960 under a constitution that provided for a parliamentary government and a substantial measure of self-government for the country's three regions, various panels have studied and made recommendations for reforming of the Civil Service, including the Margan Commission of 1963, the Adebo Commission of 1971 and the Udoji Commission of 1972-74. A major change occurred with the adoption in 1979 of a constitution modeled on that of the United States.

The organization of the Nigerian Civil Service is such that, mainly revolves around the federal ministries- usually headed by (both) a Federal Minister, who's an appointee of the President and a Permanent Secretary, who is the highest-ranking career officer in the ministry. The Federal

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Government, through the Civil Service provides basic services which covers such are as like Education, Health, Technology, Infrastructure, Agriculture, among others.

It is generally asserted that the Nigerian Civil Service is not efficient and effective, in terms of service delivery. This is majorly due to poor organizational productivity, which is a result of defective motivational tools employed by the Nigerian Government. Hence, it is a worrisome development that the welfare and well-being of the Nigerian Civil Servants are not adequately catered for, which sums up the low job satisfaction evidently present among employees.

This research work explored the relationship between Job satisfaction and organizational productivity, providing subtle *but* salient comparison between both the public and private sector in Nigeria. This researcher also critically examined motivational factors that can help increase organizational productivity in the Nigerian Civil Service Nigeria.

Therefore, the researcher centered on the identified research problems and other issue, which came up during research work with a view to suggesting prospective and long-lasting solutions to the problems.

The research examined the relationship between Job satisfaction and organizational productivity on the one hand and motivational factor that trigger Job satisfaction on the other hand.

The Researcher was able to achieve the following objectives:

i. To determine the extent to which, Organizational productivity is hinged on Job satisfaction

ii.To analyze whether or not, motivation is a key factor towards achieving Job satisfaction

iii. To find out the significance of Salary, Promotion, rewards and other incentives as motivational tools in achieving organizational productivity in the Nigerian Civil Service.

iv. To provide probable solution towards having an efficient and effective civil service in Nigeria.

The relationship between job satisfaction and organizational productivity

Several studies, in recent times have relentlessly proven- beyond reasonable doubts, the strong relationship that exists between Job satisfaction and Organizational Productivity; both in the public and private sector. (Frederick Taylor: Theories, Principles & Contributions to Management.) in his scientific management theory reiterates this strong bond. He asserts that:

"The principal object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employee,"

The words 'maximum prosperity' is used, in this context to mean *not* only large dividends for the company or owner, but the development of every branch of the business to its highest state of excellence, so that the productivity and success may be permanent. The extent of the success and productivity to be achieved is better imagined.

To achieve maximum prosperity, there are principles that should be put in proper perspectives;

1. Employer should give each worker a *definite* task to perform specifically in *definite time and manner*.
2. Employer should select the right employees for the task ahead.
3. Employer should motivate employees in order for them to perform at a high level.

Daniel Forman (1983) also strongly believes that there exists relationship between job satisfaction, self-esteem, and mental health. These three components make up for organizational productivity. He found in the study that better self-esteem and improved mental health was important recipe for a successful organization. Empirical evidence, suggests a visible attribute of the organization that always influences job satisfaction – the cognitive challenge of the work i.e the mental aspect of the job. Thus, the most effective way an organization can enhance its success, while also promoting the job satisfaction of its employees, is to enhance the mental challenge in their jobs, and the most consequential way most individuals can improve their own job satisfaction is to seek out mentally challenging job- although this is not always the case!!! Overall, although job satisfaction- quite unlike organizational productivity are deemed immeasurable and therefore not quantifiable (as in monetary terms), scores on a valid measure of job satisfaction are the most important pieces of information organizations can collect, as a good measure of its effectiveness and success. The relationships are summed up as follows:

- Job performance: The relationship between job satisfaction and performance has an interesting history. In 1985, a quantitative review of the literature suggested that the true correlation between job satisfaction and performance was quite small (Iaffaldano and Muchinsky, 1985). However, more recent evidence reveals that the relationship is larger than was previously thought. A comprehensive review of 300 studies determined that when the correlation are corrected for the effects of sampling error and measurement error, the average true score correlation between overall job satisfaction and job performance is .30. Thus, it does appear that a happy worker is more likely to be a productive one. A productive worker, in turn makes organizational productivity possible. Evidence also exists for a relationship at the work unit level – units whose average employees are satisfied with their jobs are more likely to perform at a higher level than business units whose employees are less satisfied, and to be more profitable as a result (Harter, Schmidt, & Hayes, 2002). Of course, the relationship between satisfaction and performance may be reciprocal. Not only may employees who are happy with their jobs be more productive, but performing a job well may lead to satisfaction with the job, especially if good performance is rewarded.
- Withdrawal behaviors: Job satisfaction displays relatively consistent, negative correlation with absenteeism and turnover. Job dissatisfaction also appears to display negative correlation with other specific withdrawal behaviors, including unionization, lateness, drug abuse, and retirement. These all affect organizational productivity negatively. Furthermore, (Harrison, Newman, & Roth 2006) and (Fisher, & Locke, 1992) have shown that when these specific behaviors are aggregated as indicators of a general withdrawal syndrome, job satisfaction is thus predictively negative.
- Life satisfaction. Evidence indicates that job satisfaction is also *moderately* or *strongly* related to one outcome that individuals find particularly important is life satisfaction (Tait, Padgett, & Baldwin, 1989). Since the job is a significant part of life, the correlation between job and life satisfaction makes sense – one's job experiences spill over onto life. Thus, people who have jobs that they like are more likely to lead happy lives. A happy life encourages productivity in the work place.

However, the impact of job satisfaction on organizational productivity cannot be a fully analyzed concept. This is because both concepts are relative, as they differ from place to place. (Abraham Karman, 1977) asserted that the greater the variation in job, the greater the level of satisfaction of the individual involved in the performance of the job. This is especially true of white-collar jobs. The conclusion came up with after survey of workers in both the Public and private sector in Nigeria.

Contextual framework

The empirical model of job satisfaction and organizational productivity is such, that moves along an almost equilibrium line. This is so, because just like Organizational productivity can be viewed as a simple sum of individual performances and commitment to work; Job satisfaction also can be assessed in the light of how productive the organization is, coupled with the motivational triggers available to the employees. This assertion therefore suggests that these two concepts involve both intrinsic and extrinsic factors which impacts the organization, over a period of time. Job satisfaction and organizational productivity - simply put is the totality of an organization *which includes* weighing up the worker's influence on the job, the nature of the job, the emolument, the promotion/ reward prospects, the nature of supervision, the set goals and achieved goals/objectives. Napoléon Bonaparte, a French statesman and military leader alluded to this fact, when he noted that:

"The effectiveness of the army depends on its size, training, experience and morale, and morale is worth more than all the other factors together"

(Harter et al., 2002) found positive correlation between employee's job satisfaction and the organizational performance measured by productivity, profit, employee turnover, employee accidents, and customer satisfaction. Gould-Williams (2003) suggest that when employees act diligently and have outstanding performance, the organizational performance, effectiveness and productivity will be superior. Employee behavior, in an organization is basically goal oriented. It is motivated by a desire to attain certain goal. In analyzing the relationship that exists between job satisfaction and organizational productivity, the existence of the impact of organizational success on workers' job

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satisfaction should be examined. Therefore, the question is: Does organizational success have the power to influence or enhance job satisfaction? Cole and (Cole, 2005) provide an answer when he suggested that organizational success causes employee satisfaction. Although it has been contested by various scholars and authors, there still remain to be seen- a better argument, as to prove otherwise. In this context however, (Gross and Etzioni, 1985., p. 4) pointed out that: organizational *reality and human happiness go hand and hand"*

Research methodology

Study area

This study covered the Federal Civil Service in Nigeria. The Federal Civil Service, having undergone several reforms was positioned to provide efficient and effective services to the citizenry.

Research design

To attain the standard required aims and objectives of this study; a descriptive survey (quantitative) was used. Descriptive survey is one of the empirical research techniques which is geared at describing systematically the facts, qualities and characteristics of a given population, event or area of interest as factually and accurately as possible- in order to provide answers to the questions, raised by the statement problem of the research.

Population and sampling plan

The entirety of the population of this research study is made up of Federal Civil Servant in the FCT. A slight extension was made to a private clinic (for the purpose of comparison only). The workers were drawn from various ministries and agencies of government within and around The Federal Secretariat Complex in Abuja. In all 100 respondents were picked as given below.

In the above table, forty male workers were drawn from the various ministries and agencies of government, while fifty female workers were picked from the various ministries and agencies of government. The remaining ten respondents (5 males, 5 females) were picked from a private clinic (as earlier mentioned). The sum of these employees form the population of this research work.

Source of data/ instrumentation

Primary and Secondary sources of data collection methods were used throughout the research.

Primary Source of Data: Primary data are data used by a researcher. The primary sources of data in this research work were the questionnaires administered directly to the respondents.

Secondary Source of Data: Secondary sources of data were extracts from publications, textbooks, journals and other research papers.

The combination of both Primary and Secondary source of data is aimed at providing a very reliable data for the research work, which will lead to drawing of objective and meaningful conclusion.

Method of data analysis

The method used in this research work, comprises tabulation of raw data collected from the questionnaire and proper evaluation of secondary data, in order to make sense and meaning out of it.

Results and discussion

The presentation and analysis of the data collected from the field is reviewed. It covers the personal variables of the respondents, as well as their confidential *but* sincere thoughts on the subject matter.

Table 1. Distribution on sex of respondents

Sex	Percentage	Total
Male	50%	50
Female	50%	50
Total	100%	100

Table 2. Distribution on age distribution

Age	Frequency	Percentage
21-30	45	45%
31-40	22	22%
41-50	23	23%
Over 50	10	10%
Total	100	100%

Table 2 shows that 45 out of 100 respondent or 45% of respondent were within the age bracket of 21 to 30. 22 out of 100 respondents or 22% of the population are within the age bracket of 31 to 40. 23% are within the age bracket of 41 to 50 while just 10% are close to retirement age. This means invariably, that young people are in the Nigerian civil service lately.

Table 3. Marital status

Marital Status	Frequency	%
Married	45	45%
Single	52	52%

Table 3 shows that 45% of the respondents are married, while 52% are still single. A meager 3% however admitted to have been divorced or separated.

Table 4. Position held

Position Held	Frequency	%
Director level	11	11%
Higher Executive Officer	53	53%
Executive Officer	22	22%
Chief Clerical Officer	12	12%
Clerical Officer	2	2%
Total	100	100%

This information can also be represented as follows
Director level = 11%
Higher Executive officer =53%
Executive officer = 22%
Chief Clerical officers = 12%
Clerical Officer = 2%

Table 5. Distribution based on working experience

Working experience	Frequency	%
1-5 yrs	57	57%
5-10 yrs	22	22%
11-15 yrs	11	11%
16yrs and above	10	10%
Total	100	100%

The Table above shows that the majority of the respondents are people with 5 years working experience.

Table 6. Distribution of educational qualification

Educational qualification	Frequency	%
School leaving certificate	14	14%
Diploma	22	22%

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Professional	64	64%
Total	100	100%

Table 6 illustrates that the following:
School Cert Holders = 14%
Professional certificate Holders = 64%
Diploma certificate Holders = 22%

Section B

Table 7. I have clearly defined (quality) goals

Response	Frequency	%
Strongly disagree	57	57%
Disagree	24	24%
Neither disagree nor agree	14	14%
Strongly agree	0%	0%
Agree	5	5%
Total	100	100%

57% of the population strongly disagreed that the civil service, through the relevant ministries and agencies has given them clearly defined goals and objectives to be met, during the course of their jobs. 24% disagreed, while 14% of the population felt indifferent about it- although 5% of the population (all from the private sector) agreed that, they have clearly defined goals.

Table 8. My job gives me a feeling of personal accomplishment

Response	Frequency	%
Strongly disagree	50	50%
Disagree	0	0%
Neither disagree nor agree	0	0%
Strongly agree	50%	50%

The response in Table 8 elicits a mixed feeling of despondent and happiness from the population. This, I believe is due to the fact that happiness and personal accomplishment is relative and therefore can be different with several people.

Table 9. I learn personal growth and development on my job

Response	Frequency	%
Strongly disagree	13	13%
Disagree	50	50%
Neither disagree nor agree	4	4%
Strongly agree	23	23%
Agree	10	10%
Total	100	100%

About 67% of Respondents across board admits, not to have learnt much on the job- while 33% believes they have learnt a thing or two over time.

Table 10. I am adequately rewarded for my efforts

Response	Frequency	%
Strongly disagree	57	57%
Disagree	24	24%
Neither disagree nor agree	4	4%
Strongly agree	10	10%
Agree	5	5%
Total	100	100%

A total number of 57 workers strongly disagreed, to being adequately compensated for their efforts put in the workplace. 24 workers disagreed, while 4 % felt indifferent about it. Another 15% agreed to varying degrees.

Table 11. Do you think you are well paid?

Response	Frequency	%
Strongly disagree	80	80%
Disagree	4	4%
Neither disagree nor agree	0	0%
Strongly agree	0	0%
Agree	16	16%
Total	100	100%

A whopping 84% of the population feels they are underpaid, while 16% of the respondent thinks otherwise. This is due to the fact, that the standard and cost of living is high.

Table 12. Welfare facilities provided by my organisation are satisfactory

Response	Frequency	%
Strongly disagree	47	47%
Disagree	4	4%
Neither disagree nor agree	35	35%
Strongly agree	0	0%
Agree	14	14%
Total	100	100%

54% of the population, although to varying extents- feels that their welfare is not being adequately catered for. 35% felt indifferent about it, while 14% agrees that the welfare packages are top notch.

Table 13. Is training a motivating factor

Response	Frequency	%
Strongly disagree	0	0%
Disagree	44	44%
Neither disagree nor agree	14	14%
Strongly agree	37	37%
Agree	5	5%
Total	100	100%

42% of the respondents see training as a motivating factor. 44% totally disagreed, while 14% admits to feel indifferent about it.

Table 14. Which motivates you most

Response	Frequency	%
Salary/increased minimum wage	77	77%
Promotion	14	14%
Leave	0	0%
Training	7	7%
Recognition/award	2	2%
Total	100	100%

77% sees Salary increment as the best motivation to them. 14% feels Promotion motivates those best, while 7% and 2% sees training and award as the best motivation, respectively.

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Table 15. How is the working environment

Response	Frequency	%
Not very conducive	50	50%
Not conducive	24	24%
Indifferent	12	12%
Very conducive	0	0%
Conducive	14	14%
Total	100	100%

74% of the population, to varying extent feels the office environment isn't conducive to them. 12% feels indifferent, while 14% admits that office environment is conducive. This makes up for the huge infrastructural deficit in government offices.

Table 16. Considering everything, how satisified are you, with your job

Response	Frequency	%
Very dissatisified	20	20%
Dissatisified	50	50%
Indifferent	10	10%
Very satisfied	0	0%
Satisfied	20	20%
Total	100	100%

Finally, 70% of the population is *to varying degrees* dissatisfied with their job. 20% feels satisfied, while 10% feels indifferent about it.

Analysis and interpretation of findings

Based on the information gathered from these primary sources, the following observations were made:

An overwhelming number of respondents (70%) agree to be dissatisfied with their job although it does not foreclose the prospect of improving their feelings in the future. This is due to lack of efficient reward system, coupled with high standard of living in the country.

Buttressing the point perhaps is the reason why the Federal Government, thought it wise to increase the National Minimum wage of workers in the country.

Finally, based on the analysis of the results, we can prove beyond all doubts that Organizational productivity is hinged on Job Satisfaction, among other factors.

The research also found the following:

- Majority of those in the Civil service are not satisfied with their Jobs.
- Majority of those in the Civil service thinks they are not adequately rewarded for their efforts.
- Majority of those in the civil service thinks salary increment is the best motivation ever.
- An average Nigerian worker feels the working environment in the civil service is not conducive.
- An average Nigerian worker feels training and personal development can motivate them.
- Most civil servants don't have clearly defined objectives and target to meet.

Conclusion

In conclusion it could be rightly said that general result of this present study does not differ from the acceptable degree of general compliance of similar studies in the past to their purpose upon several generalization.

One can easily conclude that exactly the same result could be expected if similar study is conducted in some selected private 'enterprises in any part of the counties at large.

The useful of questionnaire, direct interview and direct observation as instrument for collection of data for the study was effective and suitable. The questionnaire was directed to one respondent and collected in the same manner to enable me, analyze the data

Finally, one can readily say from findings that there was advance effect of job satisfaction in organizational productivity.

Recommendation

The study is concluded to investigate how government can help improve reform and reposition the Civil service in Nigeria, towards delivering efficient and effective service, by enhancing and boosting the job satisfaction level of its employees.

In view of finding, I made the following recommendation to improve a lot of workers in the economy.

- The Office of the Head of Civil Service of the Federation should lay more emphasis on workers welfare such as designing training programmes, provision of social amenities like staff quarters, and other fringe benefits in the company,
- The Office of the Head of Civil Service of the Federation should see promotion and salary policy as very vital organizational tools, because they are triggers that can stimulate employees to work hard.
- The Office of the Head of Civil Service of the Federation should work out appropriate modalities for recognizing and rewarding deserving employees.
- Finally, The Office of the Head of Civil Service of the Federation should imbibe best world practices to further improve the condition of service and other work place conditions.

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Investigating the Areas of Student Difficulty in Chemistry Curriculum: A Case Study in Qatar

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Abstract

The exploratory study focused on the identification of difficult topics in Chemistry in the International General Certificate of Secondary Education (IGCSE) curriculum. A structured questionnaire was used to obtain data from thirty students by simple random sampling technique. Interviews and focus group discussions were carried out to seek clarifications on some of the responses to the questionnaire questions and to elicit detailed explanations of the causes of the perceived difficulties. A multiple-choice test was also administered for the purpose of triangulation. Frequencies and means were used to answer the research question. The findings indicate that the causes of poor performance could be categorised into five groups i.e.: nature of concepts, prior knowledge, access to the language of instruction, teaching processes and mathematical efficacy. The study recommends a more structured form of curriculum mapping of all topics and sequencing of topics over the two-year period of study of IGCSE Chemistry and suggests further research on misconceptions and their origins in the subject matter.

Keywords*: chemistry, difficulty, concepts, abstract, igcse, sub-micro.*

Introduction

Research on students' conceptual knowledge of chemistry has been largely based on the constructivist view of knowledge (Bodner, 1986; Osborne and Witrock, 1983). In this view, the students build cognitive structures based on their own understanding (Nahkleh,1992) and hence since the students construct their own views of concepts, their construction of chemical concepts sometimes differs from that held by the generality of the scientific community (Treagust,1988). Research to reveal these alternative conceptual frameworks (Driver,1981) has been carried out by many researchers like Bradley et al, 1990; Renstrom, 1990; Ogunniyi, 1991; Banerjee,1991; Ogude and Bradely, 1994; Treagust and Niaz,1995; Themas and Shuenz,1998. The results of research have been used to improve the teaching and learning of chemistry for example, in modifying the curriculum (Blanco and Prieto, 1997), to formulate examination questions (Treagust, 1988) and to design exemplary teaching materials (Bradely, et al, 1990). Conceptual understanding difficulties, however, cannot be addressed if the strategies do not take into account the fact that daily social experiences that students have, contribute to inaccurate conceptions about diverse scientific phenomena (Ogunniyi, 2000). Furthermore, Driver and Erickson (1983) concluded that learners construct conceptual frame works for interpreting natural phenomena on the basis of previous experiences. Acknowledging the influence of social experiences (Ogunniyi, 2000) and previous experiences (Driver and Erikson, 1983), on the process of learning, means that research on conceptual understanding has to be carried out within the context of the learner for the results to be more meaningful.

Research on conceptual understanding has been criticised by various other researchers. Cohen, 1996 and Gil-Perez, 1996 opined that this type of research tends to result in conceptual reductionism (Gil-Perez, 1996). Such an approach limits science education to the learning of science concepts only, yet there is a plethora of other crucial factors like epistemology, conceptions of how knowledge is constructed and views about the nature of science, (Nos), (Gil –Perez, 1996), that also influence the way Science is learned. Research on conceptual understanding has been criticised because it isolates the students from other domains of

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knowledge, (Fensham, 1983) and does not view the fact that the classroom is a complex socio-cultural environment (Cobern, 1996). Consequently, research on conceptions just focusses on conceptual learning without considering the learning environment. Furthermore, studies examining cultural influences on learning Science have shown that culture controls both the teacher and the learners' understanding of Science (Krugley-Smolska, 1995; Lynch and Jones, 1995 and Maskill, et al, 1997). The results obtained by Lynch and Jones (1995) show that Science Education needs to be viewed in the context of the worldview in which both language and culture affect concept learning and understanding. Over the years Qatar has increasingly used a foreign Science curriculum, which uses English language as a medium of interaction. Such curriculum could be described as culturally insensitive (Ogunniyi, 1997) and hence may fail to address the learning difficulties of Qatari and other foreign students effectively.

Apart from misconceptions, there are other reasons that affect students' performance in Chemistry. As a result, strategies based on the research findings of conceptual research on their own will have little effect on the improvement of subject performance, (Zoller, 1990). The chemistry content has ….' many abstract, non- intuitive concepts which are not directly related' (Zoller, 1990). Nahkleh (1992) also concluded that the problems with freshman chemistry were caused by lack of proper introduction to students, of fundamental chemical concepts like matter resulting in students failing to grasp advanced concepts. The above studies demonstrate clearly, the need for a comprehensive approach to teaching and learning chemistry. Focusing on individual aspects without taking into account the whole puzzle will continue to result in poor performances in chemistry. Often, when teachers are introduced to some of the strategies like active learning approaches and context led teaching, they agree that the strategies are good and would improve understanding but in the same manner, they would vibrantly discuss other subject issues that they think are more pertinent. These factors must be taken into account even though the primary task would be to introduce active learning approaches and they need to be investigated in context.

Purpose of the study

The main purpose of this study was to identify the areas or topics in the secondary school chemistry curriculum which students and teachers consider difficult. Specifically, this study aimed at identifying the content areas in the chemistry curriculum at the IGCSE level, which the students find difficult. The data obtained will help improve student understanding of concepts, help teacher planning and lesson preparation and make the teaching and learning of the students more meaningful and productive.

The following research question was addressed:

What are the causes of poor performance in chemistry as perceived by igcse chemistry students and teachers?

Methodology

Thirty (30) students from one school were the subjects of the study due to the ease of accessibility to the researcher. The study made use of information gathered through a structured questionnaire given to year 11 students, (in their final year of the two year course).

Interview questions were used to collect data from 4 teachers in the same school and from year 11 students through a focus group discussion. Interviews and focus group discussions were audio taped and later transcribed verbatim.

An objective multiple-choice test was also administered to determine those sections in which the students would score low marks. The test was piloted to verify the readability of the questions. Interviews were used to clarify issues identified in the questionnaire and the multiple-choice test.

The student questionnaire was designed by the researcher and piloted to a sample similar to the one involved in the main study. The questionnaire consisted of a series of syllabus objectives per topic in which students indicated their options on a five-point likert scale with responses ranging from 1= Not studied, 2= Very Easy, 3= Easy, 4= Difficult and 5= Very

Difficult. A reliability test was carried out on the instrument and Cronbach's alpha was .935 which is considered adequate. Frequencies and means were calculated for each response.

The chemistry teacher's views were based on their empirical experiences of how students viewed chemistry as a subject, the topics/ concepts their students found difficult to learn and master and consequently those that they found difficult to teach. The teachers were asked to give reasons for the difficulties from their perspective. The students provided information about the difficult areas and reasons as to why the topics were seen as difficult. Students gave insights into how they perceived how they were taught in the subject.

Findings and discussion

Students and teachers were asked to describe topics and specific concepts that they found difficult to understand. The percentages of students and teachers indicating the topics are given in table 1. From the table, it can be observed that the teachers rank difficult topics as the mole concept calculations (64%). This was also mentioned by the students; electrolysis and half equations (51%); chemical and ionic equations (39%) which were noted by the teachers as well; drawing of displayed formulae (68%); experimental work (59%) which was not mentioned by the teachers; chemical equilibrium shift (59%) and oxidation – reduction (redox), 63%.

Furthermore, students and teachers were asked to explain why these topics were perceived as difficult. While questionnaires and interviews were used to collect the data, this data is discussed in sections that emerged from the survey which are: nature of subject, prior experiences, mathematical efficacy, teaching and learning processes and the role of the language of instruction.

Table 1. Perceived difficult topics in IGCSE Chemistry by students and teachers

Topic	Teachers (N=4)	Year 11 students (N=30) / %	Mean test score (N=30) / %
1.The mole -too many formulas to remember -difficult to use ratios	3	51	42
2. Redox -writing half equations -predicting the product at electrodes	3	39	33.8
3. chemical equilibrium -predicting the shift in position of equilibrium	3		39.8
4. Chemical formulae and equation - writing chemical formulae and equations -writing ionic equations	4	51	43
5.Electrolysis - half equations -net equations -movement of ions during electrolysis -predicting products at electrodes	4	58	42.8

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6.Polymerisation -types -drawing displayed formulae of different polymers and monomers	3	46	59.1
7. Energetics -calculation of heat change per mole -relating heat change to energy profile diagram	3	41	47.3

Prior knowledge

According to Treagust et al, (2000), there is overwhelming empirical evidence in the literature that what students already know is the key factor in learning. Usually students' pre-instructional conceptions provide frameworks that are not in accordance with the science conceptions to be learned.

All the four teachers agreed that students have difficulty mainly because of their weak background at key stage 3 level. The teachers indicated that students came into the key stage 4 phase with an inadequate conceptual understanding of basic Science knowledge. Of the total students who participated in the study, 13 of them agreed that they had not been screened at the beginning of their course (end of year 9) and 18% of them had their final year 9 grade below 60% which is a level 3 out of 7. A few students came from other schools with different curriculum systems. This could explain why the students found the subject difficult.

Students lamented that sometimes their teachers did not focus much on preparing them for key stage 4 Science "because they did not teach key stage 4 classes they did not know the important things for key stage 4.…" So, while the importance of key stage 3 science in laying the foundation cannot be overemphasised, it is worthwhile to scrutinise the nature of Science.

Nature of the subject

Table 1.1. Write ionic half-equations representing the reactions at the electrodes during electrolysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Easy	8	26.7	26.7	26.7
	very easy	10	33.3	33.3	60.0
	difficult	10	33.3	33.3	93.3
	very difficult	2	6.7	6.7	100.0
	Total	30	100.0	100.0	

All teachers concurred that students would still select Chemistry due to it being a conditional subject for their career choices. Students indicated that Chemistry was demanding in terms of concentration, time, its abstract nature and that is why they did not find the subject easy.

In figure 1.1 the abstract nature of the subject was further confirmed by the fact that students expressed anxiety with writing of equations (ionic) (66.6%), prediction of products at the electrodes and representing displayed formulae of monomers and polymers. In electrolysis, students indicated that they could not understand how ions moved as it … 'was hard to visualise how ions moved from one electrode to another".

More so, all the 4 four teachers agreed that the subject used a lot of calculations and often students did not have a formula sheet with the question paper and this discouraged the students in studying the subject. Furthermore, students had also indicated that mole calculations were very difficult to understand, hence in the end, they tried to memorise the formulas and procedures that would help them get the answers correct without necessarily understanding what was going on. Students added that they sometimes needed a lot more time to practice

questions on calculations, however these were almost present in every chapter and that puts a lot of pressure on remembering formulas. Some students (8%) also indicated that the teaching of moles could have been done using a practical approach so that they could follow what was going on instead of simple manipulation of numbers in class. It is important to mention that while calculations are an integral part of the subject content, they cannot exist in isolation to the theoretical aspects of the subject and the related practical work.

Teaching process

The results of the focus group discussion were based on students' answers to the question, why they found the concepts difficult. The responses were grouped under teaching practice and with strongly emerging factors of curriculum mapping and teaching processes. Students concurred that being in an international school teacher came and left the school inadvertently, not necessarily at the end of their contracts.

The consequences of frequent teacher turnover to a school can be catastrophic. It can adversely influence curricular and program continuity, result in a negative shift or sustainability of schoolwide initiatives, and cause a serious loss of the dynamic stability and continuity of the important relationships that exist among teachers, students, and other school community members and present obvious negative effects on schools operating budgets (Mancuso, 2010; Wu, 2012) in Tkachyk, L, 2017 pp 14. This means a lack of continuity in syllabus coverage such that a replacement teacher usually has a different if not divergent approach to the previous one. Some went on to say that in such instances there was no order in the teaching of topics and sometimes this made it difficult to connect the concepts in a logical manner.

"The curriculum is a sophisticated blend of educational strategies, course content, learning outcomes, educational experiences, assessment, the educational environment and the individual students' learning style, personal timetable and programme of work", (Harden, R, M,2009). Curriculum mapping assists staff and students by displaying the key elements of the curriculum, and the relationships between them. Students can identify what, when, where and how they can learn. Staff can be clear about their role in the big picture. The scope and sequence of student learning is made explicit, links with assessment are clarified and curriculum planning becomes more effective and efficient, which means that any new member of the department will simply follow what is laid down.

Lack of experimental practical work

Students lamented their lack of practical experiences in some topics and teachers also agreed that experimental work was usually a challenge given the numbers of students in each class, the size of some rooms and the lack of trust of the students to independently follow a set of instructions from the teacher within the given time. Classes have a maximum of 25 students especially in key stage 3, however the Science rooms were designed to cater for 18 students comfortably. The performance of experiments would be a slightly challenging feat. It is however important to carry out experiments with students since they have a paper 2 examination with a bias towards experiments. Students also indicated that some teachers simply read what was in the textbooks without much explanation.

Trna, J, (2014), opines that the experiment is a strong educational tool, which plays a crucial role in science education (p.9). He goes on to say that this is due to the decisive role of experiments in science research and the cognitive importance of experiments in science education. That is why science teachers' professional competence in using science experiments for teaching/learning science is a very important part of their education (Trna, 2000). Teachers' skills in experimentation play a crucial role overall and are a very important part of their pedagogical content knowledge (PCK) and continuous professional development (CPD). Experience in the use of science experiments is an integral part of the individual PCK of every science teacher (Royer, Cisero, & Carlo, 1993) as cited in Trna, 2014. A crucial point of science teachers' professional competence in using experiments should be their motivation for experimentation.

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Teachers felt that they could demonstrate some experiments in order to overcome logistical challenges, however students expressed interest in doing the experiments hands-on. It is clear that students believe that if they could perform experiments during lessons, this would enhance their retention of concepts.

Mathematical efficacy

Teachers and students concurred that mathematics was important in Chemistry and more so teachers felt that some students tended to compartmentalise the subjects such that ratios in mathematics were perceived differently to ratios of moles in Chemistry.

According to Furner and Kumar, 2007, more and more educators are coming to realize that one of the fundamental problems in schools today is the "separate subject" or "layer cake" approach to knowledge and skills. Often students cannot solve problems because they do not understand the context in which the problems are embedded (Frykholm & Glasson, 2005), however they go on to suggest that, "if done properly, integration of math and science should bring together overlapping concepts and principles in a meaningful way and enrich the learning context." This suggests that there is a need to integrate math and science for the acceleration of transfer of learning between both subjects. This also means that teachers, upon realising that students have not transferred their learning math's skills to Chemistry, must emphasise the fact that mathematics is a tool used to quantify variables through concrete student activities in science classes, hence the need to link to practical work.

The role of language

The research was done in an international school, with students from a diversity of cultures and backgrounds. One striking feature is that most of these students (>80%) speak English as a second or third language. Arabic is the mother tongue of most students and teachers also confirmed that the language issues contributed to the difficulty of the subject content. Teachers explained that students could not sometimes, discern the key words in the questions, hence they gave somewhat irrelevant answers. One teacher stated that…" students' answers to descriptive questions are often poorly answered". Students explained that although they understood the content, it was always difficult to understand what the question required them to do.

Mammino, L, (1998) stated that, "Science students experience difficulties with the language of science all over the world", and moreover, "students using a second/foreign language as a medium of instruction experience the additional difficulties related to such use". The overall combination of the language-related problems is probably the major cause of the difficulty's students encounter in their approach to scientific subjects. This suggests that teachers must unpack keywords, during lessons, work on literacy by way of command words used in the subject, identification of underlying key words in questions and other retention enhancing methods.

It is also vital for teachers to be cognisant of the fact that Chemistry is commonly portrayed at three different levels of representation – macroscopic, sub microscopic and symbolic – that combine to enrich the explanations of chemical concepts (language), Treagust et al, (2010). While Wu, H et al, (2003) opine that chemists represent sensory experiences by atoms and molecules, and translate them into symbols and formula. However, understanding microscopic and symbolic representations is especially difficult for students. Students' difficulties have been attributed to several factors, such as the aperceptual nature of atoms and molecules (Ben-Zvi, Eylon, & Silberstein, 1986), students' incomplete or inappropriate mental models (Kozma et al., 1996; Williamson & Abraham, 1995), and discrepancies between school science and students' real-life experience (Osborne & Freyberg, 1985) as cited in Wu, 2003.

Teachers must exploit as many opportunities as possible to link the symbolic, to the micro and the macroscopic language, hence the importance of exposing students to practical work including predictions of outcomes and the reasoning or explanations of such using equations. Word walls can also assist student memory as they are constantly in contact with the words every time they come into the room. Students can only understand when they can transit

through the different forms of representation of the chemistry language with relative ease and comfort.

Conclusion

The study explored the causes of poor performance in chemistry at the IGCSE level. It is concluded that according to the teachers, the subject has many abstract concepts and the situation is even worse when the students are second language learners. Chemistry also uses the micro and symbolic forms of language which pose a significant hurdle for the students to explain phenomena at the macroscopic level (the triplet). Teaching must then be geared towards helping the students to make connections between these three forms.

Students must interiorise, process ideas and then verbalise their thoughts which is no mean feat for second language English speakers. Language poses a huge threat to understanding of concepts. Teachers and curriculum developers need to look at ways of making content more accessible to non-native English speakers.

Mathematical efficacy is a necessary requirement in the subject. There is a need to look at inter-curricular links especially with Mathematics so that learners can easily transfer and apply process skills to science subjects. Subject planning must also take into account students' pre-requisite mathematical knowledge in the different topics.

It must also be mentioned that poor planning in terms of curriculum mapping, learning and teaching processes has compounded the issue of subject difficulty. Long term plans must give detailed information on what is to be studied and exemplar practical activities for each section. Practical activities should be suggested for concept development and consolidative purposes. Teacher mobility in international schools is a global phenomenon which should not be a cause for concern if long and medium term teaching plans are properly executed and reviewed constantly as per the requirements of specifications. It is also important to target further research on misconceptions and their origins in the topics of appreciable difficulty as determined in this study, such as the mole concept, electrolysis and others in the context of language.

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Uptake of Artemisinin-based Combination Therapy for Treatment of Acute Malaria at Federal Capital Territory Abuja, Nigeria: A Rretrospective Hospital Based Study

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Abstract

Malaria remains a major public health challenge in Abuja. Considerable efforts have been made to reduce the prevalence of the disease; however, the last decade of malaria control has witnessed increased support by government and its partners in the areas of mass distribution of long-lasting insecticidal nets (LLINs) and a massive scale up in malaria case management. Consequently, it has become necessary to provide evidence-based data on the status of progress towards malaria control. A retrospective hospital based study on the uptake of Artemisinin-based Combination Therapy drug for treatment of acute malaria was carried out using a five years hospital records from Wuse District Hospital Abuja. All the records of patients diagnosed with malaria confirmed by Giemsa stained thick and thin peripheral blood films were considered. Data was entered and analyzed using SPSS Chicago version 25. Appropriate tables and mean numbers were displayed. A chi square test was performed to determine the level of significance using 95% confidence interval and p- value. Findings revealed a total of 22,934 patients were diagnosed with acute malaria based on hospital records. Only 48.4% of the patients received Artemisinin Combination Therapy (ACT) drugs. 32.1% of the patients were given non-ACT drugs, 9.3% of patients received Sulfadoxine – Pyrimethamine, 7.59% were given Chloroquine. The study concluded that, The use of Artemisin base Combination Therapy (ACT) as recommended by WHO has a significant influence on malaria treatment outcome.

Keywords*: Artemisinin-based Combination Therapy, Malaria, Uptake, Malaria.*

Introduction

Malaria is endemic in Nigeria and remains a major public health problem, taking its greatest toll on children under age 5 and pregnant women, although it is preventable, treatable, and curable. Africa still bears over 80 percent of the global malaria burden, and Nigeria accounts for about 29 percent of this burden (WHO 2014)

In Nigeria, malaria is responsible for approximately 60 percent of outpatient visits and 30 percent of admissions. It is also believed to contribute up to 11 percent of maternal mortality, 25 percent of infant mortality, and 30 percent of under-5 mortality. It is estimated that about 110 million clinically diagnosed cases of malaria and nearly 300,000 malaria-related childhood deaths occur each year. The disease overburdens the already-weakened health system and exerts a severe social and economic burden on the nation, retarding the gross domestic product (GDP) by 40 percent annually and costing approximately 480 billion naira in out-of pocket treatments, prevention costs, and loss of man hours (FMOH 2014b)

In the FCT, Abuja, Malaria is the leading cause of death followed by diarrhea disease, URTI and UTI. Malaria accounted for about 70% of hospital attendance in the GOPD and 50% of medical admissions (FCT HHSS 2016b) . Malaria prevalence rate in the FCT stood at 43% based on the 2015 National Malaria Indicator Survey report (NBS 2015).

Artemisinin combination therapy (ACT) became first-line treatment for uncomplicated *Plasmodium falciparum* malaria episodes throughout Africa. The urgency for ACT roll-out was spurred by alarming levels of drug resistance to previously used monotherapies such as Chloroquine

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and sulphadoxine-pyrimethamine (SP) with attendance rising morbidity and mortality (Alexander et al 2009).

In early 2000, the World Health Organization (WHO) recommended to all countries experiencing resistance to mono-therapies to use Artemisinin-based combination treatments (ACTs) in treating uncomplicated *falciparum* malaria. Based on the recommendations couple with other factors such as efficacy, cost effectiveness, local industry capacity and some demographic reasons such as the appropriateness for treating in children under five years and in pregnancy, different ACTs were selected as first line drugs to replace the existing mono-therapeutic drugs (WHO report 2000).

Though first-line therapy recommendations may change, clinical practice may still be affected by factors other than the decision or ability to diagnose malaria. Age, diagnostic confirmation and suspected concurrent conditions lead to benefit: risk assessments for individual patients by clinicians as to which anti-malarial treatment to prescribe. This has implications for adherence to policy changes aiming to implement effective use of ACT (WHO manual 2003).

Appropriate management of malaria could only be achieved by using the drugs rationally. This means, using the right drug in the right patient, for the right indication, in the right dose and dosage form, for the right duration of time. The assessment of rational drug use was made difficult due to lack of objective quantitative parameters (Chedi et al 2010).

Adherence refers to the extent to which patients use medications as prescribed by health providers and is an important component of infectious disease control. For the ACTs drugs, various factors may account for non-adherence to their use in real life settings. Some studies have reported that about seventy-six percent (76%) of patients with malaria failed to complete their treatment as prescribed due to poor knowledge on malaria. It has also been established that some people would usually use medications partially or stop the treatment once the symptoms subside and keep the remainder to be used in future. Forgetfulness and poor relationship between health professionals and patients have been reported to affect adherence to the use of medications including ACTs. The use of complex or technical terminologies by prescribers has also been reported to influence adherence to the use of medications (Samuel et al 2015).

Because of the relentless increase in resistance of malaria parasites to conventional drugs, including chloroquine, sulfadoxine–pyrimethamine and mefloquine, new therapeutic approaches of using ACT drugs is a welcome development. This strategy parallels multidrug treatment used successfully in diseases such as HIV and cancer, and combines the rapid schizontocidal effect of an Artemisinin compound with a longer-half-life drug. The World Health Organization (WHO) has recently endorsed ACT as the “policy standard” for all malaria infections in areas where *Plasmodium falciparum* is the predominant infecting species (Timothy et al 2005).

Although malaria treatment policies are well established, with countries in Africa adopting Artemisinin-based combination therapy (ACT) as first-line treatment for uncomplicated malaria, problems on implementation in many settings still persist, undermining the goals of malaria treatment policy. Understanding the extent of these problems is essential for generating evidence for policy interventions to improve implementation. In Nigeria, although ACT has been adopted for first-line treatment of uncomplicated malaria since 2005, evidence abounds on the improper use of anti-malarial drugs, such as the use of monotherapies and other less effective anti-malarial drugs, as well as inappropriate use of ACT (Charles et al 2014).

Aim of the study

To show the rate of utilization of ACT drugs for the treatment of acute malaria in FCT Abuja, Nigeria

Materials and methods

Study area

FCT is located in the North Central geopolitical zone of the country. The territory hosts the capital city of Nigeria, Abuja. It is bounded by Niger State and Kaduna States in the north, Nasarawa State in the east, Nasarawa and Kogi States in the south and Niger State in the west. It has a land area of 8,000 square kilometres. It falls within the Savannah zone vegetation of the West African sub-region.

However, patches of rain forest occur in the Gwagwa plains that form one of the surviving northern-most occurrences of the mature forest vegetation in Nigeria. According to 2006 census, the population was 1,406,239. However, the projected population for 2017 is 3,740,080

The study was conducted in Wuse District Hospital Abuja Nigeria in the Abuja Municipal Area Council of the Territory. The hospital was chosen because; it is the most accessible public hospital with the highest number of bed space and high patient load compared to other public hospitals.

Research methodology

A retrospective study on the diagnosis and treatment of acute malaria based on hospital records of five years (2012-2016) and a rapid appraisal technique of Focus Group Discussions and in-depth interviews with malaria officials.

Sampling technique

All the patients' records that were diagnosed of acute malaria confirmed by Giemsa stained thick and thin peripheral blood films prior to treatment at the General Out Patient and those on admission at FCT Abuja were considered.

Data collection

This included hospital records of patient diagnosed of acute malaria in the general outpatient and those on admission between 2012 and 2016 study years. These data were collated by the hospital medical record staff after two days training on data collection using the developed tools.

Data analysis

Data was entered and analyzed using IBM, SPSS Chicago version 25, Statistical software package. The Mean numbers of malaria patients were calculated by dividing total number of malaria patients enrolled in a particular year by 12. Appropriate tables and mean numbers were displayed. A chi square test was performed to determine the level of significance using 95% confidence interval and p-value.

Table1. Summary of the treatment options for patients diagnosed with acute malaria in wuse district hospital who were admitted between 2012 and 2016 study year

Year	ACT Drugs %	Non-ACT Drugs %	Pyrimenthamine /Sulphadoxine %	Chloroquine %	Others %	Total %
2012	461 (50.7)	284 (31.2)	116 (12.7)	34 (3.74)	15 (1.65)	910
2013	440 (46.6)	367 (38.8)	85 (8.99)	34 (3.60)	19 (2.01)	945
2014	292 (44.4)	162 (24.6)	112 (17.0)	50 (7.60)	42 (6.38)	658
2015	639 (47.7)	392 (29.2)	69 (5.15)	208 (15.5)	33 (2.46)	1341
2016	469 (51.8)	323 (35.7)	61 (6.74)	35 (3.87)	17 (1.88)	905
Total	**2301 (48.4)**	**1528 (32.1)**	**443 (9.30)**	**361 (7.59)**	**126 (2.65)**	**4759**

Ethical consideration

Approval for the study was obtained from the FCT Health and Human Services Secretariat Ethical Committee. Confidentiality of data was also maintained

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Results

The summary of the treatment options for patients diagnosed with acute malaria who were on admission at Wuse District Hospital is shown on Table 1.

Keys

S/NO	ACT Drugs	Non-ACT drugs	Pyrimethamine Sulphadoxine	Chloroquine	Others
1	Artemether/ Lumefantrine	Arterolane/ Piperaquine (Syriam)	Fansidar	Chloroquine	Quinine
2	Artemether/ Amodiaquine	Artesunate/ Sulphadoxine/ Pyrimethamine	Maldox		Artemether Injection
3	Dihydro-Artemisin/ Piperaquine	Proguanil			Halofantrine Hydrochloride (Halfan)
4	Artesunate/ Mefloquine				
5	Artemisin/ Piperaquine				

From the table above, only 48.4% of the patients received ACT drugs for the treatment of acute malaria. It was observed that 32.1% of the patients were given non-ACT drugs, 9.3% of patient were given Sulfadoxine – Pyrimethamine, 7.59% were given Chloroquine while 2.65% of patients were given other drugs.

The analysis of the mean number for treatment options for the patients diagnosed with acute malaria at Wuse District Hospital Abuja is shown on Table 2.

Table2. Mean number for the treatment options for patients diagnosed with acute malaria in wuse district hospital who were admitted between 2012 and 2016 study year

Year	ACT Drugs	Non-ACT Drugs	Pyrimenthamine	Chloroquine	Others
2012	38	24	10	3	1
2013	37	31	7	3	2
2014	24	14	9	4	4
2015	53	33	6	17	3
2016	39	27	5	3	1

From the table 2 above, the mean number for diagnosed malaria patients treated with ACT drugs is highest (53) in 2016 and lowest (24) in 2014 compared to mean number of malaria patients treated with other anti- malaria drugs which was lowest (1) in 2012 and 2016 respectively and highest (4) in 2014.

This is further illustrated in Figure 1.

The Figure 1 below shows the analysis of the treatment options for patients diagnosed with acute malaria who were admitted at Wuse District Hospital Abuja between 2012 and 2016

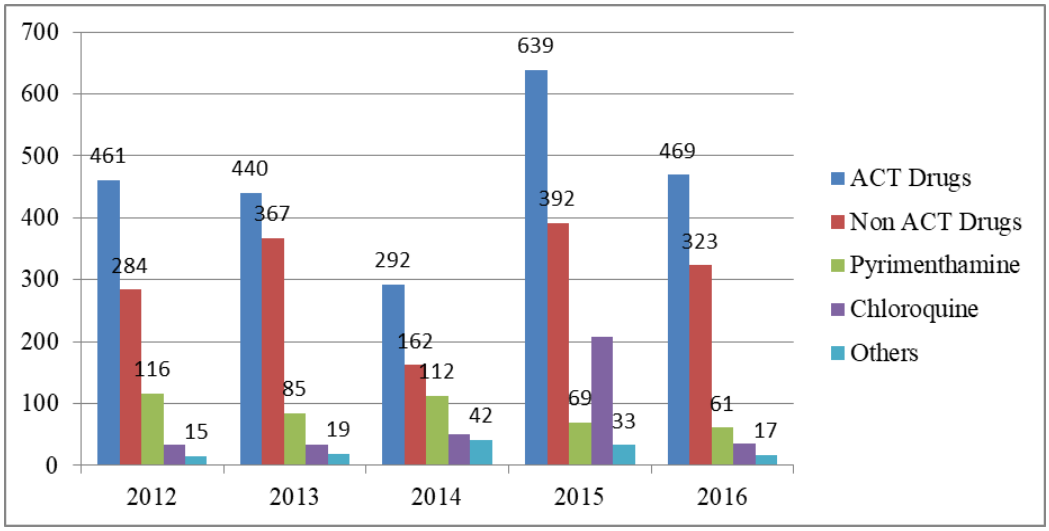

Figure 1. Treatment options for patients diagnosed with acute malaria in wuse district hospital who were admitted between 2012 and 2016 study year

The chi-square statistic is 27.5961. The p-value is .0035314. The result is significant at $p < .05$. Since the p value is less than the level of significance, we cannot accept the null hypotheses and conclude there is a relationship between treatment options and malaria cure.

The summary of the treatment options for patients diagnosed with acute malaria who were outpatients at Wuse District Hospital between 2012 and 2016 study year is shown on Table 3

Table 3. Summary of the treatment options for patients diagnosed with acute malaria in wuse district Hospital who were out patients between 2012 and 2016 study year

Year	**ACT Drugs %**	**Non-ACT Drugs %**	**Pyrimenthamine /Sulphadoxine %**	**Chloroquine %**	**Others %**	**Total %**
2012	2024 (47.2)	1347 (31.4)	642 (15.0)	173 (4.03)	106 (2.47)	4292
2013	1812 (45.2)	1594 (39.7)	393 (9.80)	153 (3.81)	59 (1.47)	4011
2014	1484 (50.8)	708 (24.2)	491 (16.8)	154 (5.27)	85 (2.91)	2922
2015	1075 (48.8)	560 (25.4)	279 (12.7)	134 (6.08)	155 (7.04)	2203
2016	2258 (54.5)	1508 (36.4)	147 (3.55)	175 (4.22)	55 (1.33)	4143
Total	**8653 (49.2)**	**5717 (32.5)**	**1952 (11.1)**	**789 (4.49)**	**460 (2.62)**	**17571**

From the table 3 above, 49.2% of the patients received ACT drugs on the average. Highest being in 2016, accounting for 54.5%. It was observed that 32.5% of the patients received Non-ACT drugs, 11.1% received Sulfadoxine- Pyrimethamine while 2.62% of patients received other drugs.

The analysis of the mean number for the treatment options for patients diagnosed with acute malaria who were outpatients at Wuse District Hospital Abuja is shown on Table 21.

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Table 4. Mean number for the treatment options for patients diagnosed with acute malaria in wuse district Hospital who were out patients between 2012 and 2016 study year

Year	ACT Drugs	Non-ACT Drugs	Pyrimenthamine	Chloroquine	Others
2012	169	112	54	14	9
2013	151	133	33	13	5
2014	124	59	41	13	7
2015	90	47	23	11	13
2016	188	126	12	15	5

From the table 4 above, the mean number of malaria patients treated with ACT drugs was observed to be lowest (90) in 2015and highest (188) in 2016. The mean number of malaria patients treated with Non-ACT drugs is lowest (47) in 2015and highest (133) in 2013. The mean number of malaria patients treated with other types of anti-malaria drugs is lowest (5) in 2013 and 2016 respectively.

This is further illustrated on Figure 2. Figure 2 below shows the analysis of the treatment options for patients diagnosed with acute malaria who were outpatients at Wuse District Hospital between 2012 and 2016 study year

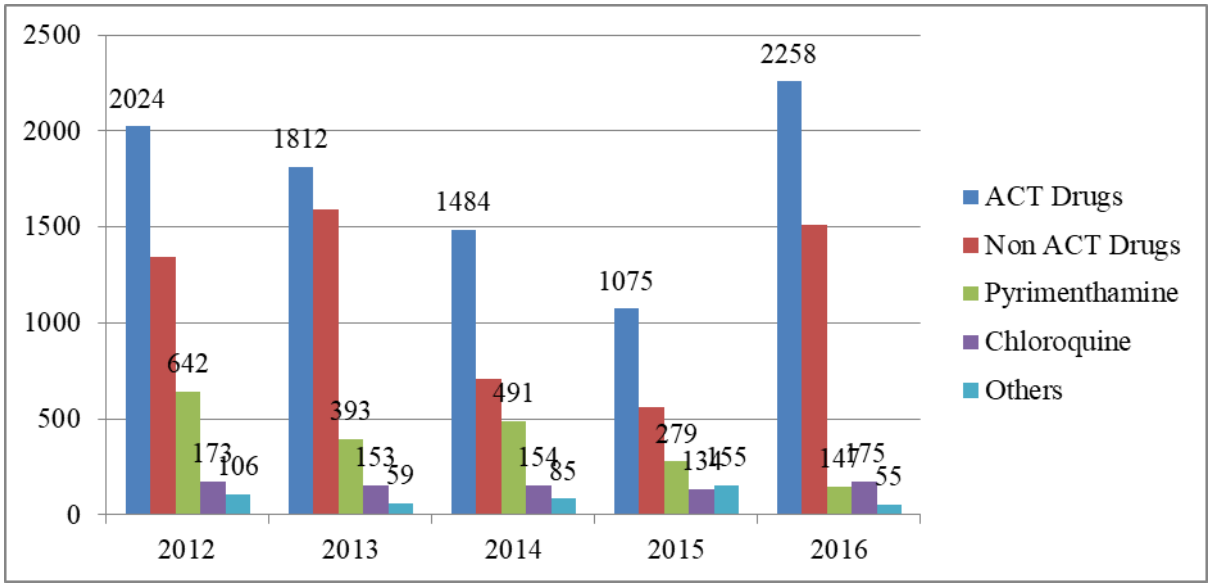

Figure2. Treatment options for patients diagnosed with acute malaria in wuse district Hospital who were out patients between 2012 and 2016 study year

The chi-square statistic for Age group is 68.6804. The p-value is .00001. The result is significant at $p < 0.05$. Since the p value is less than the level of significance, we cannot accept the null hypotheses and conclude there is a relationship between treatment options and malaria cure.

From figure 2 above, those patients who received ACT drugs were highest in 2016 (2258) and lowest in 2015 (1075)

Discussion

This is a five-year retrospective study to access the level of utilization Artemisinin-based Combination Therapy at Wuse District Hospital FCT Abuja Nigeria.

From the study, almost half of the patients who were diagnosed with acute malaria were treated with ACT drugs. The World Health Organization recommends that, patients with acute malaria be

treated with ACT drugs. This study revealed that, some doctors do not prescribe ACT drugs for patients as recommended by the WHO. This may be probably due to lack of continuous medical education for doctors to update their knowledge on malaria management. This study was in line with study done by Aborah et al (2013) on the use of non-prescribed anti-malarial drugs for the treatment of malaria in the Bolgatanga municipality, northern Ghana and which found lack of knowledge of malaria treatment as responsible for the use of non -prescribed anti malaria.

Charles et al (2014) in their study also shows use of ACT in the retail sector. However, the use of monotherapies, particularly through self-medication remains significant with increasing risk of undermining treatment policy. Etuk et al (2008) also observed low prescription of ACT drugs in children below 5 years in a tertiary health institution in Nigeria

Conclusion

From the study, The use of Artemisin base Combination Therapy (ACT) as recommended by WHO and the quality of available malaria services also has a significant influence on malaria control.

There is the need strengthen the culture of good health seeking behaviour which is an important strategy to reduce the burden of malaria. This will involve sensitization activities and awareness campaign to the FCT rural populace on the prevention and control of malaria infection. The use of radio and Television jingles in local languages will go a long way in improving knowledge and treatment protocol on malaria.

From the study also, only about 50% of those diagnosed with acute malaria were treated with ACT drugs. Therefore, there is the need to strengthen and emphasis the use of Artemisin Combination Therapy(ACT) drugs for the treatment of acute malaria as recommended by the WHO. This will involve training of medical officers and other healthcare workers by continuos medical education on current treatment protocols for malaria.

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The Education Policy with the Most Impact on the Development of Primary Education and the Implications for Attaining Sustainable Development Goal 4

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Abstract

The study aimed at investigating the education policy with the most impact on primary education in Ghana and the implications for attaining Sustainable Development Goal 4 (SDG4). The variables for the study were chosen from a population comprising of teaching staffs from the seven (7) primary Schools in Dansoman in the Greater Accra Region and other stakeholders of the education sector of Ghana. A sample size of 100 respondents were selected from stakeholder including Ghana Education Service (GES), Ministry of Education (MoE), West African Examination Council (WAEC), the seven primary schools and district offices of education as well as direct beneficiaries of education policies such as students and parents within the Greater Accra region. Questionnaires and structured interview guides were used to garner information from respondents.

The study found out that Free Compulsory Universal Basic Education (FCUBE) is the most effective education policy in Ghana. However, in order for this policy to be effective towards provision of quality education (SDG4), there must be supplementary policies that ensures economic and financial empowerment of parents and households to provide materials, food, transportation and other basic education needs of students.

The study also recommends that staff motivation packages, training and development that seek to achieve universal basic education in a long run is not neglected.

Keywords*: Keywords: impact, policy, motivation, training, and development.*

Introduction

Common sense they say is common but common sense is not common to all. Even common sense if common at all is acquired. The process of acquiring knowledge that is believed to be common to all is through education. Not everyone may agree that education is the foundation of human knowledge but certainly, education shape the way we think, behave and relate to each other. Education is very necessary but education in itself does not constitute the flow of knowledge. In other words, education is like a noun that needs a verb to perform an action. However, education in itself is not a means to an end but a system that requires other factors to produce an end. Pressman and Wildavsky (1984) argues that in order for an education system to be effective and efficient, there must be a driving force that fuels the system. In other words, the impact of education system is measured by the efficacy of various educational policies that feeds into the system.

It is by no coincidence that the Millennium declaration at the world summit of the United Nations in 2000, captured the desire of the world to achieve universal Primary education by 2015. This has come to be known as the Millennium Development Goal (MDGs). It has been 15 years and over, since the Millennium Development Goals (MDGs) (specifically MDG2) was set to eradicate non-performance of the education sector especially in developing countries. It is already three years since Ghana transitioned onto the Sustainable Development Goals (SDGs). However, the progress of Ghana on MDG2 has been mixed and not fully met. A series of gaps still exist in MDG2. This study therefore seek to investigate the education policy with the most impact on primary education in Ghana and to provide possible solution to the effective implementation of this policy.

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Background of the study

Ghana attained independence from Britain 61 years ago. Just as any developed world began their journey of development on the background of education, Ghana believes in the development of its human resource through education. Immediately after independent, Ghana formulated the Education Act of 1961. This became the first legislative instrument given mandate to the Ministry of Education (MoE) to oversee all educational affairs of the country (Ghana Constitution and Legal Frame work, 2009). The Accelerated Development Plan (ADP) of 1951 under our colonial masters (Britain) led by Dr. Kwame Nkrumah, the first elected president of Ghana was coexisting together with the education Act of 1961. The ADP brought about infrastructural and expansionary development in the education sector. This lifted the phase of primary and secondary education in the country. During this period, until the mid-1970, Ghana became known as the beacon of quality and excellence education in African (Thompson and Casely-Hayford, 2008). The years following the mid 1970's and the early 1980's witnessed many challenges in the educational sector. This led to the commissioning of several committees by several governments to inquire into the challenges in the education sector. Based on the advice and recommendation of these committees, Ghana has undertaken a number of educational reforms including school feeding programmes, increment in the number of years of senior high education from three to four years as well as the recent implementation of a complete free Senior High School (SHS) Policy (the budget statement, 2017). "One major requirement of the 2007 educational reform was the need for all students in primary school up to SHS level in Ghana to acquire basic ICT literacy skills (including Internet use) and apply these in other aspect of life" (CRDD, 2007a, 2007b, & 2007c).

Government in the quest to meet the educational needs of the country signed onto the Millennium Development Goals (MDGs) to attain among other developmental goals, universal primary education (MDG2) for all by 2015 (Ghana Millennium Development Goals Report, 2015).

It is most often argued that education is the key to success. However, the question on whether we have found this key still remains begging. According to world statistics on the progress of MDG2, primary education increased from 83% in 2000 to 90% in 2012. "Sub-Sahara Africa (SSA) has made the greatest progress in primary school enrolment among all developing regions, its enrolment rate rising from 52 percent in 1990 to 78 percent in 2012, even with rapid growth of the population of school-going age" (Ghana Millennium Development Goals Report, 2015). Since signing onto the MDGs, Ghana has integrated into its policies including: Ghana Shared Growth and Development Agenda (GSGDA I), 2010-2013, and GSGDA II (2014-2017). These policies among other initiatives are meant to promote growth and development through education. National data report on Ghana's performance on MDG2 indicates that Ghana has largely achieved set targets on MDG2. "The proportion of young people who can read and write in English, which stood at 17 percent in 1991/92, improved to 56 percent in 1998/99 and reached 81 percent in 2012/13. According to Ghana Millennium Development Goals Report (2015) "The rate among young males increased from 18 percent in 1991/92 to 84 percent in 2012/13 while that of females accelerated from 16 percent to 77 percent over the same period". However, despite remarkable gains in enrolment and completion rates, quality of education remains a concern at all levels, particularly in public basic schools with regional disparities in the quantity and quality of education outcomes, especially in the northern regions and rural areas of Ghana (Ghana Millennium Development Goals Report, 2015). The primary aim of this study is therefore to investigate the education policy with the most impact on primary education, whiles emphasizing on improvement in quantity and quality of educational outcomes in Ghana.

Problem statement and justification

One major setback in the development of primary education is that government is unable to identify the policy with the most impact to channel scarce resources for sustainable development. According to highlights of the 2016 national budget, 98.3% of total social sector budget was allocated to education and health. The budgetary allocation to education alone was 65%. Again, the highlights of the 2016 budget indicates that capitation grant was increased by 3% and 1714 out of 2578 schools under trees were replaced with decent structures. During the same period, 2016, government also rolled out the free progressive senior high school (SHS) policy. In 2017, government made SHS completely free starting

with the first-year students. This means that all primary students can enter straight into SHS upon excelling in their final exams. Among other reforms and polices undertaken by governments over the years include distribution of free school uniforms, capitation grants, school feeding programmers and many others. What next? What else has government not done to ensure educational policies benefits both the present and the future generations? In 2014, only 60% of students out of 461,013 who sat for the final exam attain the pass mark into SHS (Citifmonline, 2014). This is worrying! Parents are disturbed. Is it that government policies for education are not good enough? Could it be that the educational polices are not producing the desired outcomes? In other sense, is government not implementing the right policies relevant for the development of education in specific districts and regions? This and many other questions remain begging for answers. However, research shows that all these policies have positive impacts on primary education in Ghana. This study therefore seeks to identify the policy with the most impact on primary education in Ghana.

Research objectives

The primary aim of this study is to analyze the education policy with the most impact on the development of primary education in Ghana and its implications on SDG4. Specifically, the research aims to:

1. Analyze the benefits of educational policies on primary education in Ghana.
2. Examine the challenges of educational policies in the development and growth of primary education in Ghana.
3. To identify the best possible way to minimize the impact of educational barriers on the development of primary education in Ghana.

Research questions

The study will answer the following research questions:

1. What are the benefits of educational policies on primary education in Ghana?
2. What are the challenges of implementing educational policies on primary education in Ghana?
3. What is the best way to minimize the impact of educational barriers on the development of primary education in Ghana?

Literature review

Education

Education may be described as the oldest sector of any economy. Undoubtedly, education is inevitably the component of the economy that has lived with human existence. Many years ago, the first man to live on earth needed to communicate and to teach his ideas of survival to his predecessors. One way or the other, without school or classrooms, many have learnt the ways of life and the culture of other people. These are form of education that have been passed over space and time. According to (Stone, 1981:71) education systems portrays the nature of people, their culture, feelings, affections and way of life. This means that education has been with man and will always be with man. “Everything that which exist in time has cultural-historical aspects”-Stone (1981).

According to many researchers and scholars (Schultz 1963; stone, 1981; and Lipsky, 1980) education has no precise and concise definition. It is the commonest word known to many but difficult to define into its proper scale. However, Swami Vivekananda (1863-1902) defined education as “Education is the manifestation of the divine perfect, already existing in man”. This means that education makes us perfect. Education build and bring out the invisible in us. Education polishes our talents and build them into finished products. Thomas Raymont-1906 argues that education has always been defined narrowly ignoring self-culture and the general influence education has on one’s surroundings. According to (Blackedge & Hunt, 1985) schools are established to disseminate educational goods such as opportunities and skills to the individuals. Parson (1961) argues that schools are the agents of socialization in the communities. Education in itself is not a means to an end. Education is a process. It evolves over time and requires stratified learning and development at various stages. Education is also very involving and requires deep pocket spending and resources to sustain the sector. The main

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spending stream of government to the education sector is through educational reforms and policies. According to the New American Foundation, the federal government of the USA allocated an estimated $154 billion to the education sector. "Peak spending in real terms was in 2010-11 at £93.4 billion (2013-2014 prices)-(Bolton, 2014)". An education review by (Thompson and Casely-Hayford, 2008) states that total resources invested in the education sector of Ghana in 2006 was $billion including government, donor and all other sources. Despite this expenditure, the country is yet to achieve 100% primary education.

Education policy

Policy is not a way of life but a way series of actions have been planned to be carried out. A policy can be a standard document regulating the relationship between two parties to a contract. A policy document therefore contains a series of actions to be followed for a successful implementation and execution of a task. In the literature, many scholars and academicians have defined education policy in different ways. Haddid (1995) defined policy as "explicit or implicit single decision, initiatives or retard actions or guide implementation of decisions". Policymaking is the first step in any planning process Hiddid (1995). Taylor et al (1997) define policy as an action plan explaining what actions government wants to take, why and with what effect. However, the worry for many policy makers and implementers is not the definition but the successful implementation of educational policies (Quah, 2015). Pressman and Wildavisky (1984) argued that policies that fails to achieve their intended purpose did not have a solid foundation. In other words, the successful implantation of policies largely depends on setting clearly defined goals that are well understood by the policy implementers. A John Nyoagbe research conducted for Ghana National Association of Teachers (GNAT) to assess teacher's knowledge on reforms before implementation found that 333 teachers who took part in the study concluded, they were not adequately and properly informed prior to various reforms. Many teachers therefore suggested induction training and orientation on specific reforms and policies (Little, 2010). Psacharopoulos (1989) conducted a research on the efficiency of a series of educational policies on some East African countries. He discovered that there was a huge gap in the intended purpose of the policies vis-à-vis their achieved outcomes. He therefore came out with three main reasons for the deviations in policy implementation. These include: 1) intended policies were never implemented 2) projects that were implemented failed to meet the minimum criteria to have an impact 3) polices that were implemented did not meet their intended purpose.

Primary education in ghana

Ghana is a West African state bounded by three other countries. Just as all typical West African country were colonized and ruled by European traders who later became our oppressors, Ghana was one of those countries that began some part of its civilization with the arrival of the Portuguese in the late 15th century (Graham 1971). The people of Ghana had their own form of education which is today described as informal education. In the days before the arrival of the Europeans, learning and teaching, skill and the general transfer of knowledge was through storytelling, role-play, on the job training among others. The people of the Gold Coast (now Ghana) did not have schools where they gather to learn (Graham 1971). Everything was thought and knowledge transferred to the younger generation through apprenticeship and storytelling. The arrival of the first European in 1471 brought about a major transformation and cultural diversity. The early European in their quest to satisfy their trade desires and dominance on the African continent introduced formal education to the Gold Coast (Foster, 1963). The early education movement was white missionaries who established basic schools in the country. Famous among them were the Methodist, catholic and Anglican schools basic and secondary schools (Owu-Ewie, 2006, 76). A couple of these schools are still in existence today namely Wesely Girls School in the Central region, Achimota senior high school in the greater Accra region, which were established by the then governor of the Gold coast (Sir Alex Gorggisberg). The land scale of education began to experience massive change during post independent era from 1957 to date. The passing of the education Act of 1961 and various education policies and reforms since independent has shaped and transformed the educational system to what it is today (Owu-Ewie, 2006, 76).

Today, Ghana's primary education system is an interplay of public and private partnership. Partnership in the sense that both parties (government and private) contribute to the development of primary education in the country. Private primary schools in the country is estimated to be about 74.7% with only 25.3% public primary schools. Ghana currently operates a 6-3-3-4 system of education. This consist 6 years of primary education, 3 years of Junior High School (JHS), 3 years of Senior High School (SHS) and 4 years of university education (Ghana Issue Paper, 2006). Rustin (2015) indicates that currently, about 90% of Ghanaian children are now in school compared with 64% in Nigeria and 72% in Pakistan. Further reports show that "Ghana spends 8% of GDP on education, more than UN 6% benchmark and more than the UK's 6.5%" (Rustin, 2015).

Functions/Benefits of educational policies

Policies are formulated to perform specific functions or purpose. Although policies to some extent do not always achieve their intended purpose, they are nevertheless formulated in vague. Educational policies differ in size, scope, complexity, scale, decision criteria, and environment and in function (Haddid, 1995). Some educational policies perform multi-purpose function whiles some are intended to execute only one function. For the purpose of this study, the functions of education policy have been categorized into structural, economic, social, and cultural transformation.

Structural transformation

One of the main reasons why governments all over the world undertake education polices is to bring about structural change in the education system. Structural transformation could be in the form of change in programming, operation management, the education/school syllabus or even investment in physical structures such as school building, library etc. The fast growth of the Korean economy can be attributed to structural transformation in the Korean education system (Ferreira, Monge-Naranjo and Pereira, 2014). "South Korea, after the Korean War (1950-1953), instituted a plan of compulsory and free basic education, which led to a high enrollment rate already in 1960. In Ghana the first major structural transformation was experienced in the early 1950's and 1960's with the introduction of the Accelerated Development Plan (ADP) of 1951 and the education Act of 1961. During this period, Ghana experienced tremendous increase in enrollment and the number of primary and secondary school that were established in the country (World Bank, 2004).

Economic and financial transformation

Education resides in an economy. Hence, one of the most important function of education policies is economic impact. Ghana is one of the fastest growing economies in the world with GDP average growth rate of 6.8% per annum from 2000 to 2017. This unprecedented growth is without doubt, the manifestation of an improving education system. The economic impact of education policies is evidence in a number of micro and macroeconomic development. The education system is a means to build the national capacity and skills of individuals. Education policies plays major role in providing resources and personnel (e.g. Trained teachers, administrators, experiences) etc.) that are tapped for the development of human capital relevant for economic growth. The education system plays a major role in "producing a professionally-educated class – the lawyers, businessmen and teachers etc." (Brennan, King and Lebeau, 2004). However, the experiences of today and the rising graduate unemployment rate shows that economic resources do not match the human capacity being produced by the education sector. In reference to Peace (2013) "Youth unemployment in sub-Sahara Africa is 22.8% with figures ranging from 2.2% in Madagascar to 42% in Tanzania". Meanwhile, graduate unemployment is about 50% in Africa (ACET, 2016).

Social and cultural transformation

Most social theorist (Karabel and Halsey, 1997; King, 1983) will agree that indeed education brings about socio-cultural transformation and development in the economy. Education policies are therefore used as instrument of change to transform the way of life of the people. In the words of (Pressman and Wildavsky, 1984) policy instruments must be understood by the people going to implement the policy. Hence, if the policy is not explained to make the beneficiaries and the implementers understand how it

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will preserve or bring about positive transformation in the socio-cultural practices of the people, the policy may be rejected. "Social transformation generally involves the introduction or extension of modernity, and particularly the idea that knowledge is rational and secular and can be tested and built upon" (Brennan, King and Lebeau, 2004). According to functionalist theory, education is the foundation and the focal constitute of all other aspects of the society.

Barriers to effective education policy implementation in Ghana

In the literature the most predominant and pressing challenge of implementing education policies in Africa is largely due to political interference (Scanlon and Moumouni 2012). For the sake of this study, the researcher considered political interference into details.

Political interference

Ghana in the wake of political freedom and a beacon of one of the most achieved democracies in the world is yet to balance the wheels when it comes to political influence and rule of law. Ghana experienced what can be described as the first political interference and instability in the country after the overthrow of the first republic in 1966. The military government (National Liberation Council-NLC) took over and introduced its own reforms including the two years middle school (Pedley and Taylor, 2009). During the period, National Liberation Council was blamed for alleged interference in the education sector leading to indiscipline and unemployment of graduates (Little, 2010). Since independent until date, there have been a number of political interference whenever there is change of government. In 2001, the New Patriotic Party (NPP) came into office after the then National Democratic Congress (NDC) was voted out of power after ruling the state for 19 years. The change of government brought about an extension of the Senior High School system from 3 years to 4 years. In 2008, NDC was voted back into power and new government reversed the 4 years education system back to the 3 years. Speaking to the issue of political interference and reforms, (Kosak 2009:496 cited in Little, 2010) alleged that no government will provide primary education unless it promotes government agenda to remain in power or context another election. Other challenges of implementing education policies include inadequate financial resources, gender equality, and child labour among others.

Millennium and sustainable development goals

Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) are part of the global goal targeting the well fair of individuals within member states of the United Nation (UN). The MDGs was launched in 2000 following a series of meetings held among member countries of the UN to reach a consensus on promoting good health, eradication hunger, promoting economic empowerment especially of women among others globally. The MDGs is composed of eight main specific goals. These include Goal 1-erasdicate extreme poverty and hunger, Goal 2: achieve universal primary education, Goal 3: Promote gender equality and empower women and five other goals (Ghana MDGs Report, 2015).

Sustainable Development Goals (SDGs) is a twin goal of the millennium development goals. It is the continuation of MDGs. As the name connotes, SDGs are to build on MDGs whiles sustaining the achievements made on MDGs. The SDGs commenced in 2016 following the end of MDGs. Unlike the MDGs, SDGs is composed of 17 global goals to be attained by 2030. The goal two of MDGs is dedicated to achieving universal primary education has been fused in SDGs as part of SDG4, which is to ensure quality education is attained by 2030.

The impact of educational policies/reforms on MDGS and SDGs in Ghana

The MDGs have been implemented for the past 15 years in together with other national development plans (GPRS I, GPRS II and the GSGDA I). The implementation of SDGs is in the third year since inception in 2016. According to Ghana MDGs Report (2015) "At global level, progress on the MDGs has been mixed, with relatively weak performance in sub-Saharan Africa (SSA) and Southern Asia, even though progress might have been made on individual targets in different countries". However, Ghana MDGs report 2015 has described the achievement of the various indicators on MDG2 as largely achieved by Ghana. As stated in the Ghana MDGs Report 2015, there are unachieved target in MDGs

that have been transitioned on the SDGs. Ghana has undergone a number of educational transformations since independent. Most of these changes in the education sector was as a result of change in government (Adu-Gyemfi and Adinkrah, 2016). Whiles Ghana prepares to overcome the challenges of attaining 100% primary universal education and ensuring quality education outcomes, this study evaluates the impacts of four main education polices and their contributions to the attainment of MDGs.

Free compulsory basic education

Enshrined in the global goals (Millennium Development Goals) is the Free Universal Primary Education (FUPE), which member countries are to attain within a maximum of 15 years (Ghana MDGs Report, 2015). Before the establishment of this goal, Ghana had in its national plans a Free Universal Basic Education (FUBE) that was established before independence in 1957. All put right, this first universal primary education was free but not compulsory and mostly free for deprived students in deprived communities (Akyeampong, 2009). The education Act of 1961 and the Accelerated Development Plan of 1951 within which the FUBE was established was faced with a number of challenges, rendering FUBE ineffective. The Economic Recovery Reform (ERR) in 1983 and the transition of government from military to democratically elected leadership led to the formation of a new constitution in 1992. The new constitution reinforced and relaunched FCUBE in 1996 by the then ruling government (NDC) to ensure all barriers prohibiting participation and implementation were removed (Akyeampong, 2009). With the introduction of Education Strategic Plan (2003-2015) in 2003, FCUBE was widely covered to ensure every child of school going age enroll in school. The specific goal of ESP focused on achieving 100% Universal Basic Completion rate, for all students, comprising of 6 years of Primary and 3 years of Junior Secondary education (MoE, 2006). “This resulted in significant increase in students enrolled from 2.72 million to 2.96 million over the period from 2001-2004. Primary enrolment growth for girl students was particularly positive with increases of 3.2% in 2003-04 and 9.3% over the period 2001-02 to 2003-04” - (Ampiah, Kwaah, Yiboe & Ababio, 2014).

School feeding programme

The first educational policy of the Gold Coast (now Ghana) was the Accelerated Development Plan (ADP) (Adu-Gyemfi and Adinkrah, 2016). Although this plan has among other goals, enshrined in it was the improvement in quality education through upgrading of various facets of the educational system, with particular focus on primary education. However, ADP and the education Act of 1961 did not mention of School Feeding Programme (SFP). The School Feeding Programme (SFP) started by the government in 2005 is similar to the ones carried out by a few Non-Governmental Organization (NGO’s) in the country in the early 1950’s (Abukari, Kuyini, and Abdulai, 2015). According to USAID-EQUIPS, the implementation of the programme by donor organizations was successful. During the period, enrollment improved by 33% with girl’s enrollment recording the highest of 85% increment (Adu-Gyemfi and Adinkrah, 2015).

The school feeding programme was reintroduced in 2005. This time it was solely a governmental intervention supported by New Partnership for African Development (NEPAD) and other donor organizations (Abukari, Kuyini, and Abdulai, 2015). The programme is part of the several social interventions programmes introduced by government in line with Growth and Poverty Reduction Strategy II, Ghana Shared Growth and Development Agenda GSGDA (2010 - 2013) among other national plans. The programme has similar goals of feeding schoolchildren and increasing enrollment as the earlier one in the 1950’s. The policy apart from its primary objective of increasing enrollment also has a twin goal of creating jobs and empowering farmers locally. Government ensured that food supplied to the schools were locally grown and supplied to the schools. According to studies, SFP implemented in other parts of Africa including Nigeria, Uganda and Malawi has been successful. For example, in Nigeria, SFP has been reported to increase enrollment and attendance by 34% between 2001 to 2011(Akanbi, 2011). In Ghana, impact and evaluation study conducted on SFP in the Sekyere Kumawu school and a non-beneficiary school shows that the completion rate of primary education was 30% higher than non-beneficiary schools (Manful, Yeboah, Owusu, Bempah, 2015*)*. In the 2015 Ghana MDG report, “Gross enrolment reached 107 percent in 2013/2014 while net enrolment made slow progress from 88.5 percent in 2008/09 to 89.3 percent in 2013/14”.

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Capitation grant

A grant can be defined as a relief support or a subsidy to cut down cost. Capitation on the other hand is a form of arrangement for the transfer of some resource (normally financial resource) intended to bring some relief on the beneficiary. Capitation grant as the name connotes is a relief grant normally transferred from government to the most poorest and deprived citizens intended to leverage economic imbalance to promote survivability. Capitation grant is not a new term on the African continent. It is almost inherent in most government policies in developing economies. It is one of the major social policy interventions adopted by most developing countries all over the world (Osei, Owusu, Asem, Afutu-Kotey, 2009). Capitation grant as a major education and poverty reduction policy in Ghana can be traced back to 2005 when Ghana launched its first capitation grant. The grant can be mirrored as a policy to complement the FCUBE intervention. It is a common argument that the FCUBE policy is good but not good enough to produce the fortune expected of the education sector (Osei, Owusu, Asem, Afutu-Kotey, 2009). This is mostly due to the indirect component cost of education. These indirect costs include Parents, Teacher Association dues, transportation cost, library levies, cost of textbooks and many others. These costs are born by household. Proponents against FCUBE states the policy can only be effective if all indirect cost associated with education are abolished. Evidence of this can be inferred from Akyeampong, (2009) which emphasized that based on welfare quintile gathered from GLSS 4 (1998/99 and GLSS 5 (2005/06) the FCUBE policy did not do enough to offset the opportunity cost of schooling. Our conclusion is that the primary school attendance deficit continues to be concentrated among children from the poorest households. Government committed to the tenet of attaining MDGs and promoting quality education in Ghana launched the capitation grant in 2005 (Osei, Owusu, Asem, Afutu-Kotey, 2009). The purpose of this grant as mentioned earlier is to eradicate all associated indirect costs with basic education.

Research methodology

To analyze the education policy with the most impact on the development of primary educational and its implications for attaining SDG4, the researcher distributed questionnaires to a sample size of 100 respondents made up of parents, teachers, students, GES, MoF, West African Examination Council (WAEC) officials and head of primary schools in the greater Accra region of Ghana. Both primary and secondary data was gathered to complete the study. Excel was the main statistical tool used for data gathering. Tables and figures were also used for data analysis.

Analysis and presentation of results

Demographic features of respondents

Questionnaires were administered to all respondents, given a response rate of 100% on most of the questions. Sixty-two percent (62%) of the respondents were males while 37 percent were female. The remaining 1% representing one worker did not indicate his/her gender. In terms of age, virtually all the respondents were adults and young adults between the ages 21 and 50 or older, indicating that they have long periods of working experience (see table 1 below)

Table 1. Summary of demographic features of respondents

Variable	**n**	**%**
GENDER		
Male	62	62
Female	37	37
DEPARTMENTS		
Administration	18	18
audit	4	4
Monitoring and compliance	12	12
Finance	10	10
Policy and planning	26	26
Management	10	10

customer	16	16
NUMBER OF YEARS WORKING WITH INSTITUTION		
1-5yrs	0	0
5-10yrs	31	31
10-15yrs	37	37
15-20yrs	12	12
20+	20	20

Data presentation

The data was presented with tables to show frequencies and percentages. Where necessary, graphs were used to present data and demonstrate relationship between variables. Analyses are done based on research questions.

Current education policies and impact on SDG4

Despite the unfinished business of MDGs, Ghana has transitioned on the SDGs. The SDGs have been designed to integrate, complete and add on to the MDGs. Ghana has been implementing SDGs programme for more than two years. However, there is no change in policies apart from the addition of free SHS for first year students. The researcher therefore seeks to investigate if the existing policies can help Ghana attain set targets in SDG4. Surprisingly, 86% of respondents (see figure 1) representing majority of respondent's agreed that the policies should be maintained. The remaining 14% of respondents however, think that government should bring a lot more interventions policies. Understandably, SDG4 is only 3 years into implementation. It is therefore obvious that majority of respondents may want to see how these policies farewell in the system.

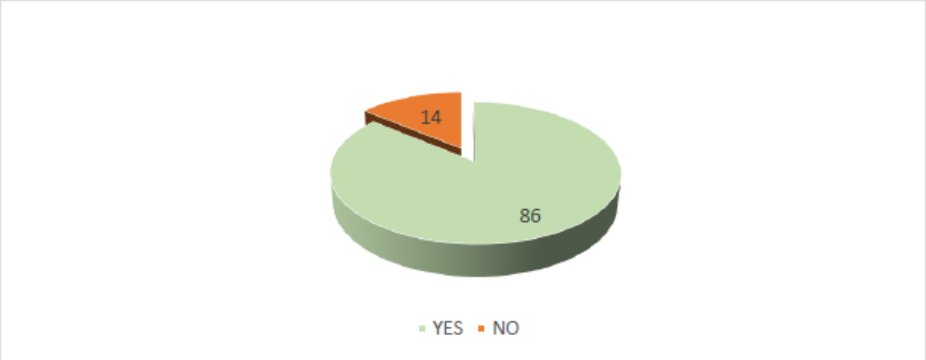

Figure 1. Current education policies and impact on SDG4

Most effective policy to attain SDG4

Concerning the pre-knowledge respondents have regarding the implementation of MDG2 and the outcome of MDGs 2015 Report on education, the study sort to find out the most effective policy to attain SDG4. The data revealed an overwhelming information splitting the respondents into the choice of different policies. However, more than 90% (exactly 90.70%) of respondents, representing 84 indicated that FCUBE is the best education policy, whiles the remaining 9.30% thought that other education policies were better option (Table 2).

Table 2. Most effective policy to attain SDG4

	frequency	Percentage (%)
FCUBE	84	90.70
Sch. feeding	2	9.30

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Capitation grant	0	0.00
Decentralization policy	0	0.00
total	86	100

Education policy and structural transformation

This section will help the researcher to know if the best education policy (FCUBE) also brings about structural change. Most respondents (53%) will not readily accept that the FCUBE brings about improvement in the management of primary education but 38 of the respondents (44%) were with the view that the policy brings about increase in the physical structure of primary education (table 3).

Table 3: Education policy and structural benefits

	frequency	Percentage (%)
Improvement in management	0	0
Increase in physical structure	38	44.19
Adjustment in syllabus	0	0
No structural benefits	46	53.49
No response (NR)	2	2.33
total	86	100

Economical and financial benefits of education policies (FCUBE)

For a policy to be classified as best for the survival of a system only makes that policy most beneficial to the system parts. Hence, the study again sort to investigate how economic policies (FCUBE) provide economic and financial benefits to primary education in the country. The results are displayed in figure 2 below.

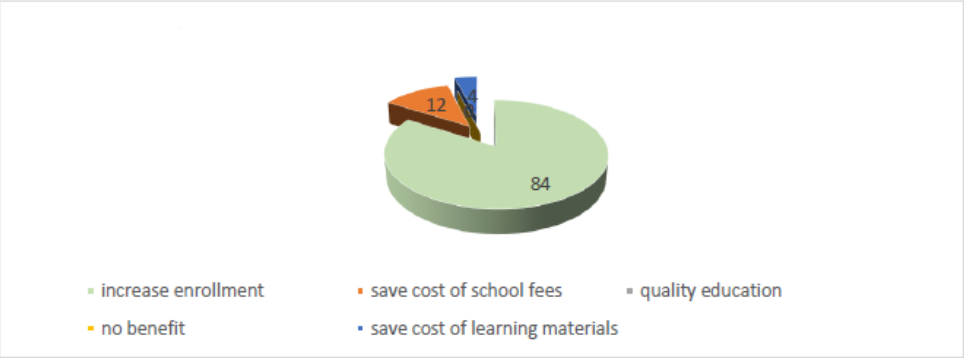

Figure 2. Economic and financial benefit of education policies (FCUBE)

Social and cultural benefits of Education policy (FCUBE)

On the social and cultural benefits of education policy, respondents were generally divided among the three main benefits as displayed in figure 3.

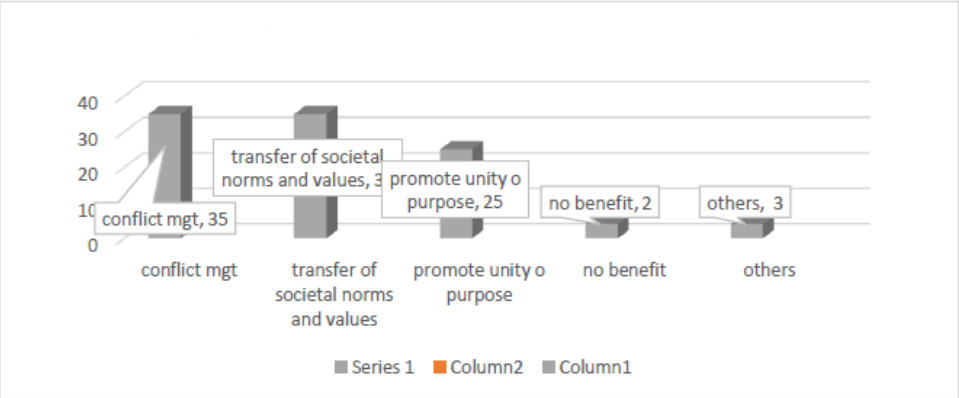

Figure 3. Social and cultural benefits of education policies

Challenges of education policies

The literature indicates that the most dominant and pressing challenge of implementing education policies in Africa is largely due to political interference (Scanlon and Moumouni 2012). According to (Summers, 2000), political influence has no single explanation and manifest into poor economic policies, corruption, civil wars, poor governance among other factors. However, the study revealed that more than 70% of respondents (exactly 72%) disagree that with political interference as the most challenge of implementing education policies in Ghana. Most respondents (72%) rather claimed that inadequate financial resources is the major setback in policy implementation in the education system of Ghana (figure 4).

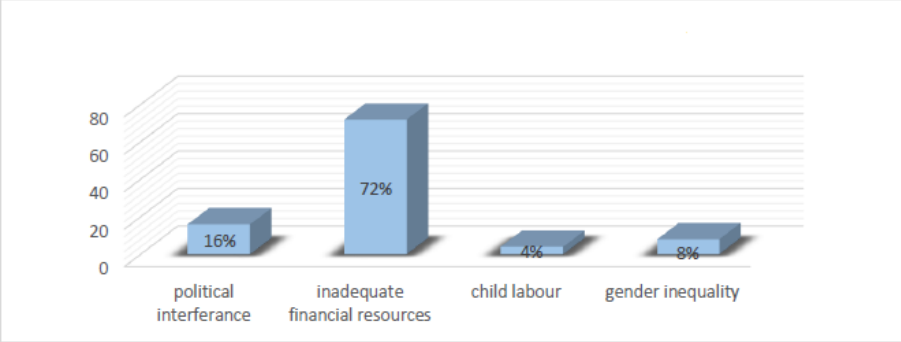

Figure 4. Challenges to implementing education policies in Ghana

Solutions to effective implementation of education policies in Ghana

Over the years, Ghana has adopted a number of system checks and measures to curb the challenges of implementing education policies. A number of them include the establishment of the public account committee to oversee all related government revenue and expenditure. The decentralization of education units both at the MoE and at GES, and currently the establishment of the special prosecution office. However, the challenges of implementing education policies still persist. In response to seeking the best solutions to the effective implementation of education policies, respondents were asked for their opinion on the best possible way to minimize the challenges of implementing education policies (FCUBE) in Ghana. Moreover, 70% of respondents believes that the best way to solve inadequate financial resource problem is through the economic empowerment and job opportunities for the citizenry (figure 5). This is agreement with the MDG1 of eradicating poverty through job creation, implemented in line with MDG2: Attain universal primary education for all. In other words, developed countries with better economies and jobs opportunities for its citizens are more likely to provide quality education to the citizens than under developed countries with huge poverty gap. This also means that when the labour-force is gainfully employed, government can raise enough revenue to undertake more policies. The people can also afford to support with the purchase of learning materials, food among others for their children who are in school.

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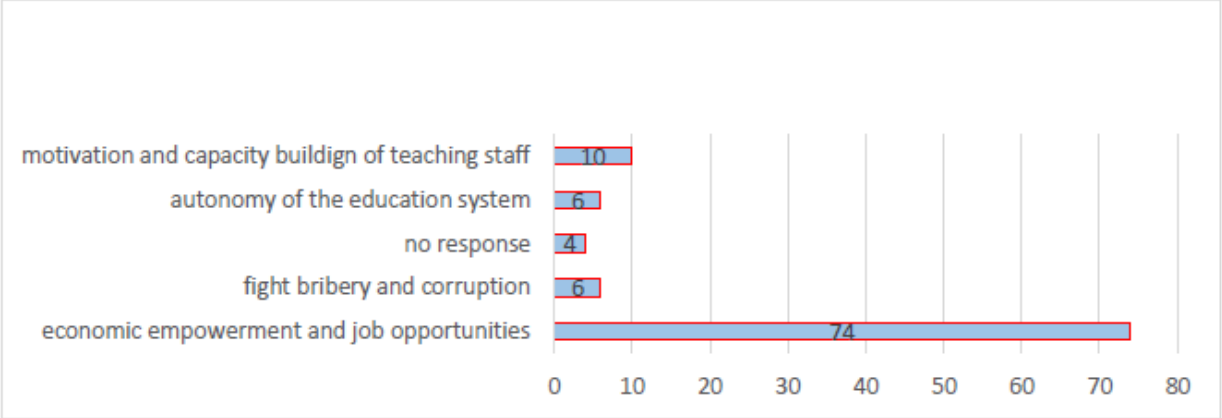

Figure 5. Solutions to effective implementation of education policies in Ghana

Conclusion

From the field data gathered and the perspective of the respondent's, it is clear that although about 10% (exactly 9.30%) of respondents did not agree that FCUBE is the best education policy with the most impact, a whopping 90.70% were certain that FCUBE policy produces the most outcome. Similarly, the most effective way to minimize the impact of the challenges of education policies (FCUBE) on primary education is to provide financial relief through economic empowerment and job opportunities for the citizenry (figure 4.6).

Nevertheless, FCUBE could increase quantity demand for education but for quality improvement, policy implantation should also focus on motivating and building the capacity of teachers (Figure 5).

Future research

Research findings on education policy are not limited. Since the numbers of students keep on increasing year on year, the enrollment of new students will become a problem. There is therefore the need to adapt complementary policies that ensures the growth and increase in physical structure of schools such as libraries, school buildings among others. Furthermore, limitation over choice of sample representation of variables needs to be overcome. This will also assist in determining if there are significant statistical differences in policy impacts from different schools between different districts, across the ten regions of Ghana. A key question to ask might be; is the impact of education policy in greater Accra is the same as in other regions of Ghana with similar background?

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The Integration of ICT in Students Information Database Management System

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Abstract

After relying on ICT for individual tasks, learning institutions realized that integration of ICT in student information database management systems is more effective. The study identifies the various benefits and challenges of integration as well as the role of ICT and Database Management Systems. Also, different departments have been discussed with respect to adoption of ICT in their DBMS. In a global context, developing countries are at the peak of technical advancement while developed nations have begun to include sophisticated innovations as the next phase of ICT. The research mentions how ICT integration influences school's operations and its impacts on students.

Keywords: *students, Database management system (DBMS), web-portal, academic records, departments.*

Introduction

The rapid advancement of ICT has enabled learning institutions to handle complex tasks with little or no effort. Database management systems are designed to safeguard and manage students' information gathered from various departments including admin, finance, and the human resource sector. Data fed into computers include students' personal details, financial history, and performances. For effective communication, academic-based web portals are created to keep students updated, especially if there are changes in timetables, assignments, examinations and any other relevant school activity (Avidov-Ungar, 2017). Integration of ICT has taken root in many public and private universities, colleges, secondary and primary schools.

In the modern society, developed countries are more advanced in technology compared to developing nations. Continents like the United States and the United Kingdom have an easier time adopting new advancements to schools than countries in Africa ("The Adoption and Sustainability of Technology-Enhanced Education in Higher Institutions of Learning in Africa", 2010). In Kenya, the ministry of education has made progress in introducing e-learning and grading systems; however, lack of ICT knowledge among the teaching staff has made it difficult to accomplish the mission. Also, most government schools are in poor conditions; they lack electricity and pupils learn under leaking classrooms. Without a proper room to safeguard data stored in servers, integration becomes a challenge.

In the US, learning institutions use ICT everywhere including grading students. Bio-enhanced systems are being introduced worldwide to secure sensitive information. While it is simple for an expert to hack the system, it is impossible to access data obtained through DNA. Their schools are equipped with enhanced safe rooms and highly trained individuals who monitor and maintain the systems (Wastiau et al., 2013). Unlike developing countries, nations like Japan use sophisticated machines to gather and store student information. Rare cases of hacking are on record, but the data is still vulnerable to viruses. Information available in the database management system can be corrupted easily. To most hackers, it is the simplest and the most secured target to destroy an entire organization especially one without back up. However, new tools and technologies have emerged to resolve major issues including data processing and analysis. Cloud computing is among the evolving trends in ICT that numerous institutions are adopting. More so, the presence of different smartphones has led to the distribution of useful applications that link students with their lectures.

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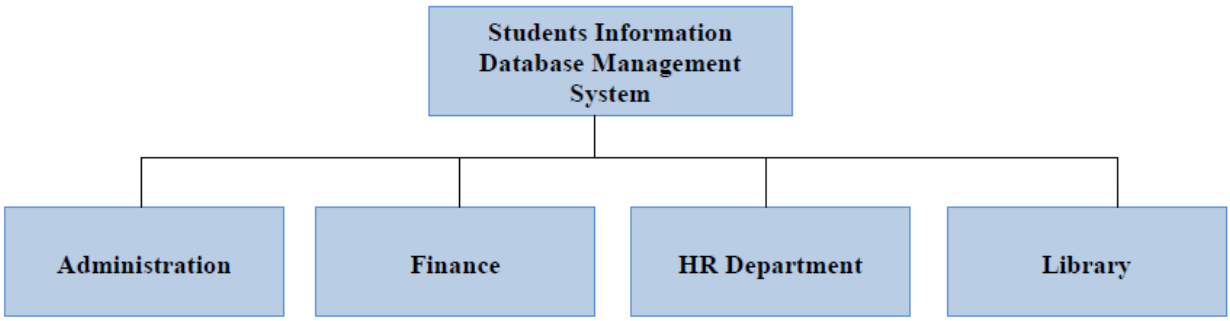
The Role of ICT in various departments



Administration

Enrolling new students has become a more manageable task because learning institutions use web-based administration systems to collect the relevant details worldwide. It saves time and money for students leaving far away and minimizes congestion within the organization. Information available in most e-admission portals includes students' requirement, courses available and their schedule, financial options, co-curricular activities, and different recognized student unions.

Finance sector

Once a student has paid school fees, the finance department is responsible for recording and ensuring that the payment reflects individual payments. The adaptation of online payment methods has made e-learning possible. However, hacking has driven away potential online students from enrolling despite the presence of sophisticated computer programs.

Human resource department

The department of human resource harbors information related to student performances, discipline, and academic progress. Most inquiries get directed to the HR sector which is well connected to different departments; when the student portal system fails, people then get directed to the HR department.

Library

The adoption of e-library saw an improvement in learning since books were no longer an issue. It has minimized the number of books lost and torn. Systems installed in libraries keep a track record of students taking and returning of books. In case one has lost a book, they demand a replacement immediately. Otherwise, disciplinary actions are applied to ensure compensation.

The Advantages of integrating ICT in students' information database management systems

- It enables the provisions of up-to-date information to parents/guardians, teachers, and scholarship boards.
- Updating records becomes less exhausting.Once this system is up & running, you can add more data and get it extracted and run with little effort.
- Tracking a student progress becomes easier because some systems are designed to alert the institute when a student misses three or more periods in a row. Similarly, the history of academic performance for the time in question is readily available by a click.
- It enhances communication within the organizations. Soon, the days of notice boards will no longer exist. Transfer of assignments and continuous assessment testament has evolved to appoint where grading systems help mark the papers.
- It helps reach a wide range of people during admission. Today, an African student can inquire, enroll and study in America without having to travel back and forth.

- Integration decongests departments and enhances smooth operations. Traditionally, students flocked the admission or finance sector for inquiries. Noisy movements along the halls interrupted classes and created chaos when services slowed down.
- It saves time and energy since access to information does not require one to move from one department to another physically.
- Integration of ICT is capable of operating multiple organizations from different countries and using different languages. For instance, Harvard University enrolls students from all over the world; integration made it possible for the organization to diversify.
- Distribution of data within an organization simplifies when successful integration is frequently employed.
- Servers do not take a lot of space compared to the traditional methods of managing academic records. Several people were hired to speed up tasks, but adoption and integration of ICT has eliminated the need for extra staff which cut cost and makes budget allocation effortless (Harvard Extension School, n.d.).

The Disadvantages of Integrating ICT in Students' Information Database Management Systems

Challenges related to the integration of ICT in learning institutions include,

- Lack of knowledge. Few people possess the right skills for managing database systems. As a field of study, ICT covers a vast area that takes years to master, and it is expensive to learn since colleges and universities charge a substantial amount of money to complete the course.
- Integrating ICT in student information database management system is both expensive in installation and maintenance. Highly qualified individuals demand a substantial amount of money to ensure the system runs smoothly. Also, programs used to ensure data safety come at a higher cost because they require updating now and then. Constructing rooms to secure servers does not come cheap and that includes hiring security personnel to keep outsiders from accessing the expensive hardware.
- It creates confusion and chaos when newly installed. As a result, standard operations are slowed down and loss of time is incurred while users try to adapt to the system. During installation, most programs are shut down as a precaution, but the process also creates an opportunity for hackers to install a backdoor to the entire system.
- System failure is a common challenge in many database management systems. It is mostly caused by overloading, data corruption, or invasion by hackers. Students take advantage of the situation by missing classes, skipping/stealing assignments, and refuse to study.
- Even with the invention of sophisticated programs, hackers are finding ways to manipulate the systems. Cases of fake degrees, diplomas, and grades have been reported.
- Data installed is vulnerable to malfunctions especially if attacked by viruses or worms. Though there are rare cases of data corruption, a motivated person can destroy stored data if he/she has access to the right software.
- In case of a natural disaster, hardware used to store data is prone to destruction. Since it is not possible to completely water-proof servers, a small leakage of water can cause a lot of damage to a building.
- It has created a gap between lecturers and students which has reduced interaction between pupils and their tutors. A teacher's physical presence helps pupils stay alert and makes them understand better.
- It requires regular updates which come in various packages. Distinguishing the legal packages from copyrights is tricky especially if one is looking for a cheaper option (Matyokurehwa, 2013).

For years, ICT has served learning institutions with tools to enhance training. Academic record management systems rose to monitor students from a single server, but the process has distanced students from their teachers. Lecturers have a habit of sending assignments and continuous assessment tests online and expect trainees to forward the papers once they are done. The presence of a trainer in class has a positive impact on a student's progress. An academic material sent for students to study is useless if the teacher is not available to explain the concepts. Instead, it encourages

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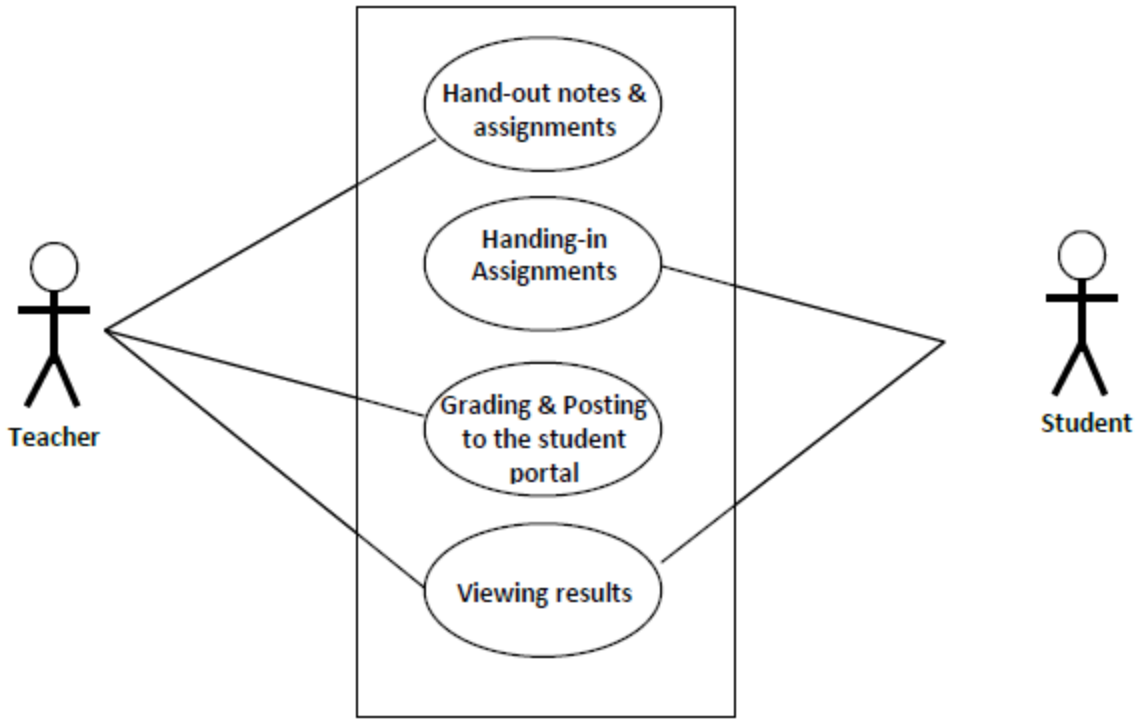
children to copy from others or purchase assessments online. Despite the challenges, changes brought by ICT integration have not been a complete failure because other than making work easier, it has created employment.

Teacher-Student relationship in many learning institutions



As ICT students continue with their studies, most schools offer advanced training in the form of internships and later hire them for specific jobs. Every organization employs qualified individuals to operate, maintain and run systems without interruptions. It is advisable to have a good backup plan that will restore data lost in case of a system failure, or the hardware is damaged. To prevent corruption of files, installation of anti-viruses is recommended; however, one should invest in a licensed anti-virus which will save the organization from data loss and speed up the system. By the 25th century, schools will be relying heavily on ICT globally. At the time, the cost of installation and maintenance will be reduced. Most people will have ample knowledge in the field and developing countries will have improved schools in the rural areas to accommodate ICT.

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Teacher Education and the Teaching of Subitizing in Early Childhood Centers in Lusaka Urban, Zambia

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Abstract

The aim of the study was to at examine the extent to which early childhood teacher education Mathematics programmes prepare early childhood teachers for teaching subitizing to young children in Early Childhood Educations centers in Lusaka urban in Zambia. Using both qualitative and quantitative approach a description study was conducted. Semi-structured Key Informant Interviews (KIIs), Focus Group Discussion (FGD) meetings, questionnaires and documents and records analysis were designed and used to collect data.

The findings from the study revealed that the Zambia National Curriculum Framework and the National Numeracy Framework in Zambia do not state the topic or term subitizing. These national documents start with topic number and notation. Under this topic counting is covered first. All text books and reference materials used at teacher educational level and ECE teachers in ECE centers do not mention the term subitizing. The understanding of the concept of subitizing was found to be poor, insufficient in coverage and inadequate in content. The Key Informant Interviews revealed that both lecturers and ECE teachers thought subitizing and counting were one and the same thing. The questionnaires, focus group discussion meeting and document analysis revealed that the topic was not planned for and had no time allocation.

In order for all colleges of education to improve the performance of ECE students in teaching subitizing in ECE centers, it is recommended that the content of the mathematics curriculum, all text books, reference materials and the National Numeracy Framework should include and start with the concept of subitizing.

Keywords*: Subitizing, early childhood teachers, curriculum, mathematics programme, colleges of education, early childhood center.*

Introduction

The Government of the Republic of Zambia (GRZ)'s policies and legislation are guided by the National Instrument 'Vision 2030' which sets the country's long-term objectives and targets to make Zambia a middle-income country by 2030. The Seventh National Development Plan (7NDP) is a five-year medium-term plan spanning 2017-2022, The Seventh National Development Plan departs from sectoral-based planning to an integrated (multi-sectoral) development approach under the theme "Accelerating development efforts towards the Vision 2030 without leaving anyone behind". The bottom line is poverty alleviation for the Zambian people. The 7NDP under the education chapter has aligned its goals with the National Policy on Education (NPE), the Education For All (EFA) goals and the Millennium Development Goals (MDGs) and the United Nation Convention of the Rights of the Child (UNCRC) among others. In order to achieve the EFA Goals, Government was expected, among other education aspects, to provide Early Childhood Education (ECE) services to all children despite their backgrounds, gender and abilities by 2015 (UNESCO, 2006).

Zambia made the Education for All goals a fundamental and repetitive feature in all comprehensive policy frameworks starting with the Focus on Learning of the early 1990s. A dominant feature of Educating Our Future Policy document of 1996 was the domestication of the EFA Goals notably on universal provision and access of primary education for all, bridging of gender gaps in access and participation as well as addressing the challenges of education quality and relevance. Additionally, to the educational policy have been other specific policy interventions meant to address specific challenges

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in the attainment of EFA and educational policy goals such as the declarations of Free and Compulsory Primary Education in 2002.

Acknowledging the importance of early childhood education in improving children's performance later on in education and in terms of more broad social outcomes such as good health, a stable family life, higher chances of employment and lower crime rates, Goal One adopted by the Education for All World Education Forum in Dakar Senegal in the 2000 was designed as follows: "Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children". However, Gove and Cvelich (2010) note that a large proportion of the 615 million children who are in school in developing countries, are performing poorly in literacy, numeracy and essential life skills.

There has been recognition by the Ministry of General Education (MoGE) of continuous poor performance in mathematics in the country, and as a result, the ministry came up with strategies to address it. In the education policy document, *Educating Our Future* (1996), the Ministry of General Education acknowledged the fact that development of basic numeracy and problem-solving skills as early as early childhood is a panacea for improving performance not only in numeracy and mathematics but in all other aspects of learning and living. Despite the priority placed on numeracy and a lot of interventions put in place, the performance has continued to be mediocre.

The Southern Africa Consortium for Monitoring Educational Quality (SACMEQ) was officially launched in Harare, Zimbabwe, in February 1995. The main aim of SACMEQ is to provide policy advice to key decision makers on educational quality issues considered as high priority by their respective ministries of education. It was awarded continuing long-term assistance through the generous aid of the Government of the Netherlands. Later it changed the name to the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SEACMEQ). Currently, SEACMEQ consists of 15 Ministries of Education in Eastern and Southern Africa: Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia, Zanzibar and Zimbabwe (Ministry of Education, 2010). It is an international non-profit developmental organization of 15 Ministries of Education in Southern and Eastern Africa that decided to work together to share experiences and expertise in developing the capacities of educational planners to apply scientific methods to monitor and evaluate the conditions of schooling and the quality of education.

Since then SEACMEQ has been releasing results of pupil performance in Mathematics and Literacy and member countries are ranked according to the performance of the pupils in the member countries. From the year 1999, successive National Assessment Surveys on learning achievement and SEACMEQ reports continue to show that performance in numeracy had remained at below the desirable level of 40percent in Zambia. Furthermore, the results published in 2015 by SEACMEQ showed that Zambia was ranked the lowest in the mean performance in mathematics among a group of 15 countries.

Mathematics proficiency is an academic and economic driver for any country, especially Zambia. It provides a crucial foundation for accomplishing other academic and career goals (Baroody, Lai, & Mix, 2006; Jordan, Hanich, & Uberti, 2003). Building roads, houses, running, and traffic control or cooking, all need the understanding of numbers. Mathematics skills develop in a cumulative manner with early skills forming the foundation for the acquisition of later skills (Aunola, Leskinen, Lerkkanen, & Nurmi, 2004). This is why it is known as a science of a hierarchy of abstractions. It has been observed too that even before children enter grade one, the individual differences in performance in numeracy and pre-mathematics are visible (Berch, 2005; Stevenson et al., 1990), and are predictive of later mathematics achievement and school achievement in general (Duncan et al., 2007; Ginsburg, Klein, & Starkey, 1998; Locuniak & Jordan, 2008; Mazzocco & Thompson, 2005). This eventually affects national development. Children who lag in mathematics in their early years, usually continue to lag in their entire learning and academic trajectory than their more advanced classmates (Aunola et al., 2004). This calls for swift intervention as early as possible.

Basic number concepts and skills (numeracy) generally emerge before entry into school. Children's numeracy knowledge is obvious in their developing counting skills. It is also evident in their capacity to compare, share, order, estimate and calculate different quantities. Fundamental skills in recognising and responding to numerical cues are apparent in infancy (Wynn, 1995a; Xu, Spelke, & Goddard, 2005). Children show these skills in many everyday problem-solving situations involving numbers and

measurement. For instance, they may reason about who has more or less, devise strategies for creating equal shares of countable objects or amounts, or use counting in a range of situations to reason about a single group of objects or to compare two groups. It is therefore, important to promote the development of these competencies in young children and to know the best learning methods to use. These skills are often predictive of children's future school achievement. The extent to which children grasp numeracy skills in the early years is highly dependent on the ability of early childhood teachers to devise teaching strategies that foster the acquisition of numeracy skills, especially the ability to subitize.

According to Geist (2004), immediately after birth infants are surrounded by an environment that is filled with opportunities for leaning mathematics. As infants grow older, and enter pre-school, they engage in activities where they could have mathematics experiences. During play, young children sort, count, compare, classify, put together (add), and take away (subtract). When playing with sand and water, they receive not only sensory pleasure but also acquire concepts of measurement for example capacity, volume, temperature, mass and even time. Numbers and Mathematics are all over the place and are integrated into the children's everyday life. When children are standing in a line in readiness to go out doors or wash hands (ordinal numbers) or buy something from the tuck shop (counting money), they repeatedly come across mathematics opportunities. Ginsburg (2006) says the world of children is full of mathematics opportunities.

Children cultivate a significant understanding of numerous aspects of mathematics including numerosity. A number of researches suggest that young children develop significant mathematics proficiency early in their lives. According to Gelman and Gallistel (1978), young children as young as 2, 3, and 4 years can recognise numbers of items under four. This is called subitizing (Clement 1999). Canfield and Smith (1996) found that even infants have capacity to notice abstract number information. They indicated that five-month-old infants used visual expectation to show the ability to distinguish three pictures presented in one location from two pictures in another location. This shows that infants as young as five months could count up to three. Starkey (1992) also found that young children have the capacity to reason numerically. Children actively create mathematics knowledge through their day-to-day experiences and have the ability to understand this knowledge spontaneously (Baroody, 2000). In order to take advantage of this ability early childhood teachers should be equipped with strategies to use as they teach during their pre-service training.

According to Clements (1999), subitizing is "instantly seeing how many." The Wikitionary indicates that the term originates from a Latin word meaning "suddenly". Subitizing is the direct perceptual apprehension of the numerosity of a group. In the first half of the 20th century, researchers believed that counting did not imply a true understanding of number but that subitizing did (e.g., Douglass [1925]). Many saw the role of subitizing as a developmental prerequisite to counting. Freeman (1912) stated that although measurement focused on the whole and counting focused on the unit, only subitizing focused on both the whole and the unit and for this reason, subitizing underlay number ideas.

Carper (1942) suggests that subitizing was more accurate than counting and more effective in abstract situations. In the second half of the 20th century, both researchers and educators developed several models of subitizing and counting. They based some models on the same notion that subitizing was a more "basic" skill than counting (Klahr and Wallace, 1976; Schaeffer, Eggleston, and Scott, 1974). One of the main reasons for this was that children can subitize directly through interactions with the environment, without social interactions. Backing up this point of view, Fitzhugh (1978) established that some children could subitize sets of one or two but were not able to count them. However, these very children could not count any sets that they could not subitize. It was concluded that subitizing is a necessary precursor to counting.

Performance in mathematics and science subjects in many African countries has been poor and Zambia is among the worst examples recently (GRZ Grade 12 Mathematics results, 2017). The importance of having a solid background in numeracy is well recognized as it serves as a gateway to future professions in a variety of fields. In other words, numeracy competence is an essential component in preparing numerate citizens for employment and it is needed to ensure the continued production of highly skilled persons required by industry, science and technology. Despite the importance of numeracy in all aspects of life, there are still challenges to foster numeracy and more specifically subitizing in early childhood owing to the inability of early childhood teachers to employ teaching

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strategies rich in numerosity and subitizing. Unless there is an investigation into the strategies early childhood teachers employ to foster subitizing and numerosity and their ability to organise numeracy corners, the level of numeracy in early years will continue dwindling and this will have an impact on the future mathematics prowess in adult life in Zambia. This study was undertaken to examine the teaching of subitizing in colleges of education which has an impact on how subitizing is taught in ECE centers. It is why I strongly feel, there is need to carry out a research study on how early childhood teachers teach subitizing in early childhood centers in order to enhance numerosity. More specifically to establish whether there is a relationship between teaching subitizing in colleges of education and ECE centers. It is for this reason that this study was undertaken to examine the extent to which colleges of education prepare ECE teachers to teach subitizing to children in ECE centers.

The reviewed literature shows that subitizing is a foundation concept and skill for numeracy and numerocity and as such teaching it to trainee ECE teachers has a bearing on the quality and content of activities ECE teachers organize for the children in their classes. Literature also indicates that subitizing can be taught using games and play activities. The implication of this literature review is that a gap exists in the programming of mathematics in Zambia. In an effort to remove this gap, this research was conducted to examine the position of the topic subitizing in national curriculum and text books used in colleges of education and also establish how graduate ECE teachers from colleges of education working in ECE center plan for and teach subitizing.

Purpose of the study

The purpose of this study is to examine the position of subitizing in the national mathematics documents of Zambian including the text books and reference materials used both in colleges of education and ECE centers. It also focused on establishing how it is taught in colleges of education and in early childhood centers in Lusaka Urban, Zambia.

Research questions

a) How does early childhood teacher education Mathematics programme effect the teaching of subitizing to children in early childhood?
b) What is the role of the National Numeracy Framework and the National Curriculum Framework in teaching subitizing?
c) Is the time allocated for teaching subitizing sufficient for the acquisition of the skill of subitizing by pre-school children?

Methodology

In order to answer the research questions, quantitative and qualitative research approaches were used. The questionnaires used to collect quantitative data were: questionnaire for teacher educators; and 2) a questionnaire for ECE teachers. The second instrument used to collect data was the interview. The interview was in three forms; that is Key Informant Interviews (KIIs), semi-structured personal interview, an interview in a form of focus group discussion meeting. The FGD was recorded and later transcribed and main themes categorised. Third, in order to examine the curriculum content and its implementation, document analysis was conducted. The different methods of data collection were used in order to triangulate the information obtained.

Data analysis

A mixed approach which involved a simultaneous triangulation of methodological and data sources was used during data analysis. Consequently, both quantitative and qualitative data analysis procedures were used. The data obtained through interviews, documents and records and focus group discussion meetings were analysed thematically using content analysis. Additionally, thematic connections obtained formed the basis for data grouping. The measures suggested by Braun and Clarke's guide to the 6 phases of conducting thematic analysis (2006) was used to analyse the data based on the connections recognized and come up with the major themes from the study. Quantitative data from questionnaires were first coded, entered into the computer and later analysed statistically using the Scientific Package for Social Sciences (SPSS) software version 16.0. This was aimed at generating

simple descriptive statistics in form of frequencies, tables and graphs. While the two data types were analysed separately, they were triangulated for easy interpretation. This was done by looking for key themes in both the qualitative and quantitative data, which could be put together into single categories.

Results

Effective teaching is guided by a good curriculum. Curriculum includes the content of courses (the syllabus), the methods used (strategies), and other aspects, like norms and values, which relate to the way a learning institution is organised. In order to establish whether the curriculum was appropriate for imparting knowledge and skills of subitizing to trainee ECE teachers, which could in turn affect their teaching of the concept of subitizing and care of children in their classes, the following aspects were analysed: the content of the curriculum, the methods of teaching, strategies of teaching, and the allocation of time for classroom instruction, practical work and field experience. The teaching resources and equipment were also analysed.

Position of subitizing in the Mathematics curriculum

Studies (Clements & Sarama, 2009; Hartman, Jung, & Conderman, 2012) show that teachers can help children acquire the concept of number and quantity by including subitizing activities in the mathematics curriculum. Many teachers and teacher educators, text books do not include subitizing activities even though it plays a very important role in the development of number sense. Subitizing supports numerous mathematics skills.

According to Palomares and Egeth (2010), many studies on enumeration have established a gap between counting small and large numbers, which has been taken to reveal two distinct cognitive mechanisms. Counting four or fewer elements is fast and exact, and has been termed as ‘‘subsidization” (Kaufman, Lord, Reese, & Volkmann, 1949). On the other hand enumerating five or more elements has been termed as counting or estimating. This therefore means that if there is sufficient time, participants may count each item slowly and serially; if not, they may quickly and imprecisely estimate the number of items in parallel (Dehaene, 1992). This study focuses on subitizing.

In order to find out where the concept of subitizing is positioned in the National Numeracy Framework of Zambia (2016) and the National Curriculum Framework, the respondents were asked to indicate the position of the concept of subitizing and the responses are found in Table 1, which show that 70 percent of the respondents indicated that subitizing is covered under Number notation while 30 percent indicated different locations including the factor that it was not there at all. This is because subitizing has not been separated from counting, a concept covered under number and notation.

Document analysis

Document analysis revealed that subitizing is not mentioned in the teacher education curriculum and lecturers do not plan for teaching the concept. The topic Number Notation reflects a sub-topic counting but not subitizing. Analysis of documents in ECE centers revealed that teachers do plan for counting but none of the records (syllabus, schemes of work, records of work, weekly forecast and lessons plans) mention the term subitizing. The term subitizing does not appear in any of the documents reviewed.

Key informant interviews (KIIs)

The chairperson of Zambia Association of Mathematics Educators (ZAME) had this to say:

“Subitizing can impact almost the entire primary curriculum and impact the later secondary education. The simple flashing of a collection of dots can massively enhance students' number sense. The best part of this is that students love it and I hear it if we have to miss subitizing in our daily routine”. (The chairperson of ZAME is a mathematics teacher at Hill Crest Technical School in Livingstone).

“The concept of subitizing was omitted from the curriculum and ECE syllabus because it falls under counting” (Continuous Professional Development coordinator [CPD])

“There is nothing wrong by omitting subitizing since children can count”. (Grade level team leader)

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Subitizing, the national curriculum framework and national numeracy framework

Understanding the use numbers, ability to think and work with numbers is what is referred to as number sense. There is still debate (Conderman et al., 2014) on whether subitizing is a skill that comes before counting, it is however, and evident that subitizing can and should be taught. It has been established that subitizing has a strong and positive impact on the development of number sense skills, which is the most basic and foundational of all mathematics skills. More and more research are supporting the fact that subitizing should be taught

While the National Numeracy Framework of Zambia (2015) gives general guidelines on the sequence of topics, teachers are left to decide which specific skills in number and quantity should be emphasized. Counting is emphasized but ECE teachers should also focus on representation, relating and operating whole numbers, starting with grouping of objects. The ECE Syllabus (2015) emphasies that teaching numeracy to young children should help children understand numbers, ways of representing numbers, relationships among numbers and number systems. Consequently, representing numbers and understanding their relationships (e.g., 4 is 2 more than 2) are two critical elements in early mathematics instruction. The foundation lies in the ability to subitize numbers.

Clements and Sarama (2009) stated that early numerical development depends on four interconnected fundamentals: (a) subitizing, (b) counting with conventional number words in a stable order, (c) enumerating collections of objects, and (d) numbering skills. Children move from acquiring this essential knowledge of number, to understanding relations between numbers, to operating with numbers (Clements and Sarama, 2007; National Research Council, 2009). In this study, the results presented in Table 8 show that almost all (97.5 percent) ECE the teachers think that subitizing should be taught both at college and ECE level.

Coverage of the concept of subitizing in colleges of education

To establish the coverage of the concept of subitizing during the teacher education programme at college, the respondents were asked to rate the coverage of the concept of subitizing and the responses are presented in Figure 1. Figure 1 shows that most (72.5 percent) of the teachers thought the coverage of the concept of subitizing was not adequate during training at the college of education.

Document analysis

The curriculum for diploma in ECE, the syllabi, schemes of work, weekly forecast and lecture notes were analyzed in order to answer this question. This analysis revealed that subitizing did not appear in any of them.

Interviews

From the interviews conducted with ECE teachers and on this particular subject, it was revealed that coverage of the topic of subitizing was almost zero as the concept was never used during training except for the concept of counting. The difference between counting and subitizing was not explained. All (100 percent) interviewees agreed that they had never heard of the concept of subitizing before**.** This shows that subitizing as a concept was not covered during training in colleges of training.

KIIs revealed that the concept is consider as counting and that they do not view it as an omission in the syllabus or in teachers' planning.

Time allocated for practicing subitizing by trainee ECE teachers

Subitizing is taught by exposing learners to number patterns that they can immediately recognize. The brain is trained to see organized groups of numbers. When students can successfully subitize, they are able to mentally compose (bring together) and decompose (break apart) numbers. They are able to quickly add numbers together without counting one by one (Reid, 2016). The more learners are exposed to differently arranged objects the quicker they will be able say the number of objects presented either in pictorial or real format.

In order to establish the adequacy of time set aside for teaching subitizing in colleges of education and ECE centers, respondents were asked to indicate the number of hours. The result revealed a lot of variations and contradictions among the respondents. This could have been as a result of vague

understanding of what concept of subitizing was and their inability to differentiate it from counting. The documents analyzed revealed that there was time set aside for Number and Notation, under which the topic of counting falls but there is nothing or no specific time set aside for subitizing as a stand-alone concept.

Over and above, the time set aside ranged from 1hour to 15 hours. The truth of the matter is that subitizing continues to be used by children and teacher right through the primary years. Since the concept was not very clear to ECE teachers, they could not apportion time to it but they did apportion time for teaching counting to young children.

Document analysis

Document analysis was used to establish how much time was set aside for teaching subitizing in the Government of the Republic of Zambia National Curriculum Framework (2013) and the National Numeracy Framework (2015) under ECE section. These documents did not allocate time for teaching subitizing in all colleges of education reached. The other materials written and used by lecturers were also analyzed and no allocation of time for teaching subitizing was found. These analyses revealed that there was no time set aside specifically for teaching subitizing. The lecturers had no schemes of work that indicated allocation of time for teaching subitizing. There was however, time for teaching number notation and counting in particular**.**

Teaching subitizing in colleges of education and ECE centers

The results indicate that 80 percent of the respondents agree with the statement that there is a relationship between what trainee ECE teachers are taught in colleges of education affect the way they wat they will teach subitizing upon graduation.

Results from interviews

During the interviews conducted with the ECE teachers, all (100 percent) respondents indicated that there was a relationship between colleges teaching the subitizing concept and the ability of ECE teachers to teach it to young children. The reason forwarded being “You cannot teach what you have not been taught”. Other respondents indicated that the books they were referred to during college did not mention the concept of subitizing so they had “no idea it was supposed to be taught”.

Conclusion

The following major conclusions were drawn from this study**:**

a) Colleges of education do not prepare ECE teachers to teach or enhance subitizing in ECE centers**.** The document analysis, KIIs, Interviews and questionnaires confirm the absence and lack of familiarity with the concept of subitizing. The argument that it comes under counting does not justify its exclusion as it is psychologically a very different process and a different concept. The implication for ECE teachers is that they leave college not having heard of subitizing and continue teaching rote counting and feeling they have covered all numeracy skills that children in early childhood need. This creates a gap in the acquisition of numbers sense. The gap continues into primary school. Additionally, the KIIs revealed that college ECE student learn only pure mathematics and not what and how to teach children in ECE.

b) The mathematics curriculum in colleges of education and the National Numeracy Framework, all mathematics textbooks and core reference materials do not mention the term subitizing or how it could be taught to children in early childhood. This means that even if a student was interested in learning more on what should be taught from books they would not come across text books that talk about subitizing and the role it plays in helping children become numerate and develop numerosity. Some books however, do talk about principles of numbers and counting. The principle of one-to-one correspondence is there in text book but is not presented as a principle of subitizing.

Based on the findings of the study, the following recommendations are made. Of great importance is the fact that there is an urgent need to intervene in the teaching of subitizing, numeracy and mathematics in general both at College of Education and ECE levels in Zambia. The fact that the

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curriculum, lecturers and ECE teachers lack theoretical knowledge and skills in teaching subitizing has implications on the quality of service they provide to learners in general in the acquisition of numeracy skills by the learners they teach. This is reflected in the annual results in mathematics at different educational level in the country.

Subitizing being a foundation to numerosity should be well taught and skills well cemented in the leaners in order change the results in mathematics in the country.

The following are the recommendations arising from the study:

a) In order for all colleges of education and universities to improve performance of ECE students in mathematics, it is recommended that the government reflects on the content of the mathematics curriculum and the National Numeracy Framework to include subitizing;
b) Since all text books and major reference materials used in colleges of education and ECE centers at the moment have no units or chapters on subitizing. It is recommended that a unit or chapter on subitizing be added and;
c) The teaching/learning aids are inadequate and inappropriate for teaching subitizing in both colleges of education and ECE centers. It is therefore recommended that both the lecturers in colleges of education and ECE teachers should be trained on how to produce cheap teaching/learning materials that could be used to teach children subitizing in a play manner.

Tables

Table 1. Unit in the curriculum under which subitizing is found

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Number notation	7	70%	70%	70%
Other	3	30%	30%	100%
Total	**10**	**100%**	**100%**	

Figures

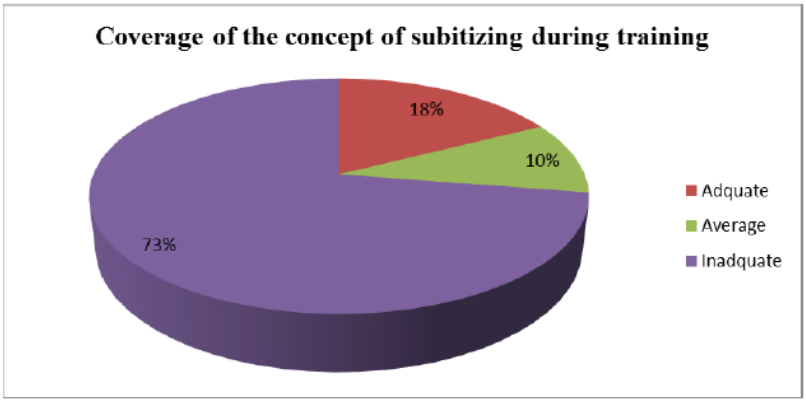

Figure 1. Rating the adequacy of the coverage of the concept of subitizing

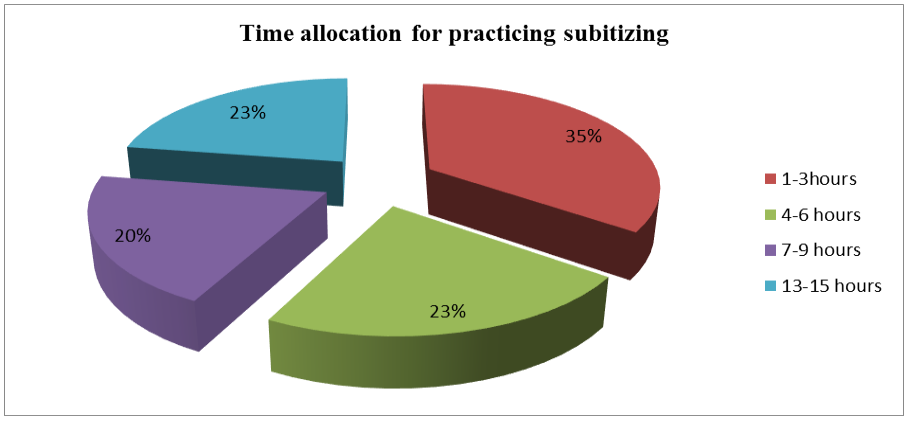

Figure 2. Time allocation for practicing subitizing

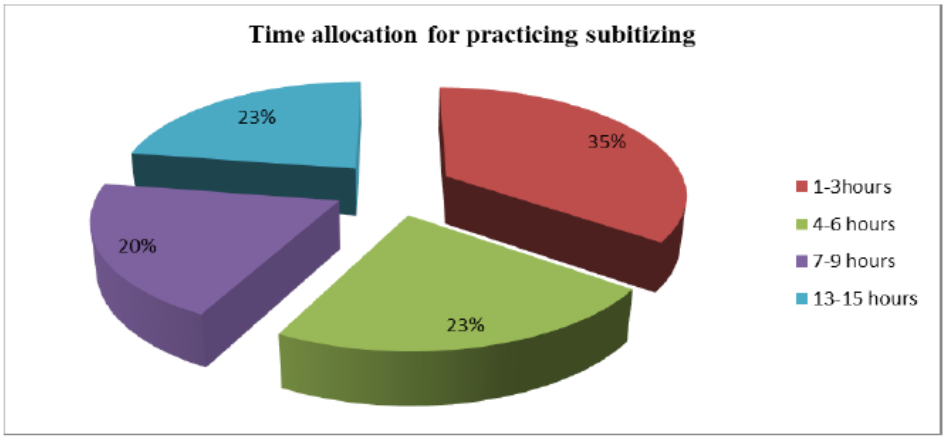

Figure 3. Teaching subitizing in colleges of education and ECE centers

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