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INFLUENCE OF PARENTS' INCOME ON STUDENTS' PERFORMANCE IN SENIOR HIGH SCHOOLS (SHS) IN THE AWUTU-SENYA AND EFFUTU EDUCATIONAL DISTRICTS

DANIEL YELKPIERI

CENTRE FOR EDUCATIONAL POLICY STUDIES

UNIVERSITY OF EDUCATION, WINNEBA

GHANA, WEST AFRICA

dyelkpieri@uew.edu.gh/yelkpieri2017@gmail.com

Abstract

The study sought to investigate how parents' income levels influence their ability to support their children's education at the SHS level, and how such situations affect students' academic performance in schools. A cross sectional survey was used as the design. The sample size was 528. The population of the study consisted of school officials, teachers, students and parents. Purposive, census, quota and random sampling techniques were employed to select the respondents. Questionnaire, semi-structured interview schedules, and documents were used in the data collection process. Descriptive statistics were used in presenting the data. Teachers agreed that the financial status of parents generally affected students' achievement levels in the study area. Parents found it difficult to support their children's education and were unable to pay their school fees, other levies and also provide their educational materials. Parents who were hard hit by this situation were those who did not have employable skills such as subsistent farmers. The study further found that about 22% of the students owed fees in arrears. Respondents were of the view that well educated parents who were well paid were able to pay for their students' education and provided their needs. It is recommended that the Government of Ghana should take measures to ensure that needy students are given scholarships and bursaries so as to reduce their financial pressures they experience in school.

Key Words: Socio-economic status, Parents' income, students' financial status, school fees, arrears

Introduction and Research Problem

It is generally, acknowledged that "education costs a lot of resources such as time, money and effort" of parents (Casas, 2023, p. 833) and this has direct link with their socio-economic-status (SES). It is also found that there is a significant relationship between parents' income level and academic performance of students (Eknath, 2018 & Chioma, Ezegbe and Onuoha, 2017). According to Chioma, et al., (2017) income levels of parents influence the academic achievements of students, even though parents have a critical role to play in improving the academic achievements of their children by way of moral support, financial and materials needed for school. They observed that parents who are professionals have the capacity and potential to support their students to perform better and improve in their academic pursuit as a result of the provision of learning material. This implies that parents' SES is determined by the type of jobs and incomes they earn. All these factors are directly related to their level of education, skills and training they have acquired over the years (Davis-Kean, 2005). Well educated and skillful people who are usually employed in the formal sector earn better salaries than those employed in the informal sector. Chioma et al., (2017, p.1619) found that although 45% of the students involved in their study disagreed that a "greater academic achievement is attained by students from financially buoyant families, an analysis of means of the sample population for the variable shows a mean of 2.97 which is greater than the 2.5 average point indicating that there is a greater chance that students from financially buoyant families are likely to attain greater academic achievements at school". However, a comparison of parents' financial status as against the students' academic grade point showed no significant variation in their children's mean scores for parents with high, medium and low-income levels. Therefore, Chioma, et al., concluded that the results may indicate that academic achievements of students in High Schools in Japan are relatively the same irrespective of whether their parent is in the high, medium and low-income levels.

Contrary to the findings of Chioma and her group, The Wing Institute at Morningside Academy (2022) reveals that students whose families have higher financial capability continue to be more proficient in mathematics compared to students from disadvantaged families across all grades. It is noted that the gap in their performance continue to widen as those students from high socio-economic-status families keep on improving as compared to their counterparts from disadvantaged families.

Ackah, Adjasi, Turkson and Acquah (n.d., p.4) note that the 'public sector attracts the highest earnings' in Ghana. They note that farmers who form about half of the population earn the least.

In terms of occupation the Ghana Statistical Service [GSS] (2014) found that most of the people in the Effutu Municipality are unskilled and engaged in crafts and related trades, fishing and subsistent farming, petty trading, mining, and quarry, while a small percentage is employed in the formal or public sector. Ackah, et al., (2012, p.4) found that 'manual workers earn 62 per cent less than their skilled counterparts'.

The types of job parents do determine their income level and their ability to support their children in school. It is observed that family educational attainment and socio-economic-status (SES) influence the academic performance of their students (Asikhia, 2010, Eknath, 2018). They argue that the two are inseparable. The reason being that social class could be described as more objectively using indices such as occupation, income levels and education. It should be noted that wealth correlates strongly with education and occupation. It is also observed that educational outcomes are influenced by family background in diverse ways (Schulz 2005 & Adzido et al., 2016). It must be pointed out that SES of families has consistently been found to be a crucial factor

in explaining variance in students' achievement levels in schools. It is observed that parents with higher SES are more capable of providing their children with the needed financial help and the home resources that create the enabling environment for learning. Udida, Ukwayi and Ogodo (2012, p.130) also contend that higher SES families are more able to send their students to better school because they can afford the cost, especially in countries where there are 'differentiated educational systems'. This situation is not common among parents and students in the Awutu-Senya and Effutu Educational Districts because of the low SES of most parents in this area. This is as a result of high unemployment rate of 64.6% among the people of the study. The Ghana Statistical Service (2014, p.31) has found that:

> ...the male economically inactive population (69.2%) are more than the employed population (33.7%) with the unemployed recording higher proportion (66.4%) than the employed population. The corresponding proportions for the females are 68, 33 and 62.7 percent.

This suggests that male unemployed population is generally high and therefore compounding the unemployment situation in the country. The research further indicates that 'there is high proportion of economically inactive population in the age category of 15-34', and that 'four out of five (78.6%) of this age group did not have jobs (GSS, 2014). The study indicated that the economically inactive population figure is higher at ages 65 and over than the employed. This implies that the economically active ones are few compared to the inactive group. These pieces of information highlight the poverty situation of the study area.

The economic situation of the area affects children's education and level of educational attainment. It suggests that poverty might have forced many students from low SES background to either miss classes sometimes or driven out of class due to non-payment of fees. This research is underpinned by the cultural and social capital theories (Bourddieu & Passeron 1977 & 1970) that emphasises the social assets of a person such as education, intellect, life style and social networks in that society. This phenomenon has attracted the researchers' attention to investigate into the influence of income levels on educational performance of SHS students in the study area.

Purpose of the Study

The purpose of this study was to investigate the influence of income levels of parents on students' education at the SHS level in Awutu-Senya and Effutu Educational Districts. The specific objectives are:

1. To identify the different ways in which parents' income levels influence their children's education.
2. To identify some of the effects that they experience as a result of financial difficulties.

Research Questions

The study sought to investigate the following research questions:

1. How do parents' financial situations influence children's education in the Awutu-Senya and Effutu Educational Districts?
2. Which sectors' (public, private formal and private informal) of the labour force has the highest number of students progressing to SHS level and beyond?

Significance of the Study

The research provided credible data for all educational stakeholders in the study area such as Ghana Education Service (GES), municipal and district assemblies, NGOs, and policy-makers.

The also provided an insight into how financial difficulties influence children's education and also serve as a n awareness to all stakeholders of education to put their shoulders to the wheel to push education to its rightful place. The study further provided data for researchers and also add to existing knowledge in the area of study.

Research Design

The mixed triangulatory approach, using a cross-sectional design was used in this study. This method enabled the researcher to collect both quantitative and qualitative data.

Population, Sample and Sampling Techniques

The population consisted of school officials, teachers, students and parents in the study area. The target population was final year students in the four selected Senior High Schools (SHS). The total enrolment of the students was 2,032. The sample for the quantitative data was 500 respondents which included both teachers and students. The sample for the study was 528. The breakdown is as shown in Table 1.

Table 1: Distribution of Respondents

Category of Respondents	Number
School Officials	8
Teachers	189
Students	311
Parents	20
Total	528

The school officials who included headmasters and bursars were purposively selected because of their experience, knowledge and dealings with students and parents. The aim of purposive sampling was to select 'participants in a strategic way', because of their experience and knowledge 'relevant to the research questions' that were posed (Bryman, 2008, p.415). The researcher also selected all teachers in the selected schools using census method. The reason was that most of the teachers were parents and so had the needed experience to share.

The students were selected based on proportional representation from the four selected SHS. This was worked out by finding the ratio of the number of students in a particular school to the total number of students of the four selected schools and then multiplied by the students' sample (311). The formulae used is:

$$\frac{N\ x\ Students'\ Sample}{Grand\ Total\ of\ Students}$$

For example, Winneba Senior High School $= \frac{841\ x\ 311}{2032} = 129.$

This formula was used to calculate the other three schools to obtain the number of students who represented the various schools in the study.

The sampling of the parents was done based on household sampling. Therefore, the researcher included people of all social classes in order to make the study more representative. The sampling

procedure comprised of the selection of households within the communities. This was done based on two identified common settlement categories observed by the researcher. Creswell (2005, p.204) stressed that 'a purposive sampling strategy in which the researcher samples individuals that differ on some characteristics or trait...' in order to satisfy all section of the target population. These were advantaged and disadvantaged communities. Convenient sampling was used to select 10 parents from advantaged communities in the study area which included settlements like new townships, university communities and communities where most public servants such as lecturers, nurses, medical doctors and teachers live. In a similar way, 10 parents were conveniently selected from disadvantaged communities such as fishing, farming and Zongo communities. People selected in this category included fishermen, fish mongers, subsistent farmers, and cleaners among others.

In all, 10 conjugal households were selected from the communities for household interviews. Couples willingness to participate in the study was the criteria used in selecting them. The 10 households were adequate for this study because the other respondents equally had good knowledge about the influence of parents' jobs and incomes on students' education.

Instruments

Structured questionnaires were developed to collect data from teachers and students. This was more economical in terms of time and cost of transport if the researcher had used semi-structured interview schedules. The questionnaire had both close and open ended items. The closed ended items took the form of a five-point Likert Scale with responses ranging from strongly agree to strongly disagree. The open ended items provided opportunities for the respondents to provide first hand information.

The main issues that were covered in the questionnaires were parents' financial situation and its influence on students' education and the ranking of the different categories of workers in the study area to determine which of them had the highest number of children in SHS and beyond.

The semi-structured interview schedules were developed to collect data from school officials and parents. This method was useful because the researcher had the opportunity to probe for further information where necessary. The interview questions were also based on the same themes as the questionnaire.

The researcher used documentary sources in collecting data. This source provides credible data for research purposes. Documentary sources just like secondary analysis of data are used to support or explain a prevailing situation of some events or phenomenon at a given time (Best &Kahn, 1995; Bryman, 2008). In the present study the researcher needed information about payment of students' school fees so the school bursars referred to their financial records whenever such questions were asked.

Face Validity and Pre-testing of the Instruments

In order to establish the face validity of the content, the questionnaires were first given out to colleague Research Fellows at the Centre for Educational Policy Studies for their comments on the items. These comments helped to improve the quality of the items. The exercise enabled the researcher to establish the reliability of the questionnaire for the study. The questionnaires were pre-tested in Apam SHS. Apam SHS was chosen because it lies in the same geographical location as the study area and therefore had similar characteristics.

The reliability of the questionnaire was established by the use of the test-retest reliability. According to Tuckman (1994, p.180) 'one way to measure reliability is to give the same people

the same test on more than one occasion and then compare each person's performance on the different testings'. On two occasions the tests were given out to the respondents and both tests were subjected to Cronbach's coefficient alpha to determine the internal consistency of the items and these yielded high reliability coefficients of .86 in each case. This result was good enough as Tuckman (1994, p.180) stresses that 'reasonably high coefficients are' indications of high quality. On the part of the semi-structured interview schedules when the researcher used triangulation and member checking to establish the trustworthiness of the responses.

Findings and discussion

Descriptive statistics were used in presenting the quantitative data and were followed up with the qualitative data. The findings were also presented according to the research questions.

Parents' Financial Circumstances and its Influence on Children's Education

Parents' financial status determines the support a parent can give to his or her children in school. The better the finances, the stronger the support provided by parents to children, all things being equal. The survey examined this assertion from the perspectives of teachers, students, school officials and parents. The data is presented in Table 2.

Table 2 shows a weighted mean of 4.11 and a standard deviation of 1.13. This implies that teachers agreed on the view that parents' financial status determines the type of school their children attend. The present study affirms the finding that the desire to enrol in a prestigious school becomes so competitive that it favours applicants who come from the home of the socio-economically advantageous (Antwi, 1992; Agyeman, 1993). This finding is equally supported by Moneymax (2022) who argues that average tuition of private schools in Philipines is so high that the average monthly family income of a Filipino family could not afford to send a child to those schools.

Table 2: Teachers' views on Parents' Financial status and how it Influences Children's Education (n =142)

Views	WM	Std	I
Parents' financial status determines the type of School their children attend	4.11	1.13	A
Parents' ability to support students' education influence their confidence level, and attitudes towards learning	4. 15	0.89	A
Parents' financial status determines the ease with which students fees and other levies are paid.	4.62	3.42	A
Parents' financial status determines the level of provision made for learning and writing materials	4.12	0.94	A
Parents' financial status determines how regular a student is given money for lunch and transport for school.	4.40	3.51	A
Parents' financial status influences how regular Students attend school.	3.42	1.16	N
Mean of means = 4.14		**Standard deviation = 1.84**	

Key to the Table

SD = Strongly disagree, D = Disagree, N = Neither agree nor disagree, A = Agree, SA = Strongly agree, WM = Weighted mean, Std = Standard deviation, I = Interpretations

Interpretations

5 = Strongly agree, 4.0 – 4.9 = Agree, 3.0 – 3.9 = Neither agree nor disagree,
2.0 – 2.9 = Disagree, 1.0 – 1.9 = Strongly disagree

Table 2 reveals that respondents agreed that parents' financial status determines the ease with which children's fees and other levies were paid. This argument is supported by Adzido (2016) who observed that when parents have solid financial status their children have improved motivation and learning process resulting in better academic achievements. This is evidenced in the data which show a weighted mean of 4.62 and a standard deviation of 3.42. When the researcher tried to find out how early they pay their children's fees, the responses obtained support the finding from the teachers' questionnaires. Some of the parents' responses are:

> *I do not pay my children's school fees outright, I pay them by instalments. During the period that I was not working but doing my own little things, paying my wards' school fees was a big problem. But when I started working, I have been paying the fees and sometimes I take a loan to settle the debt.*

> *Their father is jobless, so I, the mother always bear their school expenses. As a result, I usually pay late and plead with the school authority to allow me pay by instalments.*

The data reveal parents' admission that they were unable to pay all the fees of their children outright in a term. This implies that some parents have difficulty with their finances and as a result they pay their children's fees by instalments. At least, parents who are low salary earners are better off than the under-employed parents who engage in their own small businesses. The former is able to raise loan from his or her bank to support the children's education whereas the latter could not do same. Ornstein and Levine (2006, p.323) observed that 'social class is associated with many educational outcomes... They noted that, 'working-class students not only have lower achievement scores but also are less likely than middle-class students to complete high school or to enrol in and complete college'.

Aside these interview data from parents, some school officials also affirmed parents' concerns expressed with respect to the difficulties they encounter in paying their children's fees. Some school officials observed that:

> *... at the end of the term we sack about 70% to go for their fees. As the term is coming to an end now, we will drive them away to go and collect their school fees. So payment of fees in this school is very difficult.*
>
> *Apart from those who are on bursary and few others who are assisted by some agencies, the greater majority have a lot of difficulty paying their fees. Even in this case, the agencies only pay the boarding fees leaving the others. ... someone is owing to the tune of one thousand four hundred cedis.*

These interview data confirm that some parents have challenges paying their children's fees. In most cases, parents are not gainfully employed; they are petty traders, small scale business owners, etc and therefore are unable to make ends meet. As a result, they make sacrifices to pay their children's fees in a term. Nyarko (2011) noted that some mothers sell their clothes and other property to enable them pay school fees and provide other educational needs of their children. The data indicate about 70% of students are sacked from class to collect their fees from time to time. The seriousness of the situation is underscored by the fact that some students could owe fees to the tune of over one thousand Cedis.

In the light of these findings, the researcher tried to ascertain if the experiences some of the students encounter by way of having to be driven away from school have any effects on the students. The responses from some of the school officials are that:

> *Yes, yes, if a student is financially handicapped and is unable to pay the fees and we sack him, it affects the student psychologically and academically.*
>
> *Sometimes the embarrassment associated with non-payment of fees causes students to stop schooling altogether. Some drop out of school and engage themselves in petty trading.*

The data gathered from respondents affirm that such an action makes students lose some lessons and this affects them academically and psychologically since they become embarrassed when driven away. It is also observed that students who miss class always have arrears of learning tasks (Gyimah, 2014).

However, when the researcher tried to investigate if parents' financial status influences how regular students attend school, the respondents neither agreed nor disagreed to the assumption. This is supported by a weighted mean of 3.42 and a standard deviation of 1.16. This means that parents' inability to pay their children's fees to some extent resulted in irregular attendance. This is in agreement with Gyimah's (2014) observation that respondents were of the view that parents' inability to pay school fees may result in the student becoming truant.

In the open-ended questionnaire, students raised some concerns that they face. Students cannot be effective in school without the needed textbooks and other materials. Such a situation makes teaching difficult for teachers because students without these materials are unable to participate fully in class activities. Parents who are unable to provide children's needs may ask children to stay home while they try to look for some money. It should be noted that financial difficulties students face can sometimes discourage them from going to school because they cannot afford to be so helpless and miserable in the eyes of their colleagues. Studies of high socio-economic homes reveal that students are more likely to take advantage of their economic situation which provides all the necessary materials such as text books, writing materials and other support put at their disposal (Nwadinigwe, 2006; Aikens &Barbarin, 2008; Adegbenga, 2010; Chioma et al., 2017).

Over all, teacher respondents agreed that parents' financial circumstances affect students' education. This is indicated in the mean of means presented in Table 2 (mean of means = 4.14 and a standard deviation = 1.84).

When these same issues were examined from the students' point of view, it was found that students agreed with teachers on the issue that parents' financial status determines the ease with which students' fees and other levies were paid (weighted mean = 4.04), and the level of provision made for learning and writing materials (weighted mean=3.97). They however, neither agreed nor disagreed on the issues such as the type of school students attend, confidence level and attitudes towards learning, how regular a student is given money for school and how regular a student attends school.

In general, students neither agreed nor disagreed on the issue as to whether parents' financial circumstances affect students' academic achievements. The present finding is in line with Ornstein and Levine (2006), Chioma et al., (2017), and Eknath (2018) who observed that social class is associated with many educational outcomes in addition to achievement in reading, math, and other subjects.

Table 3: Students' Views on Parents' Financial Status and how it Affects Children's Education (n = 311)

Views	WM	Std	I
Parents' financial status determines the type of School their children attend	3.85	1.27	N
Parents' ability to support students' education influences their confidence level, and attitudes towards learning.	3.92	1.15	N
Parents' financial status determines the ease with which students fees and other levies are paid	4.04	1.09	A
Parents' financial status determines the level of provision made for learning and writing materials.	3.97	1.13	N
Parents' financial status determines how regular a student is given money for lunch and transport to school.	3.93	1.12	N
Parents' financial status influences how regular Students attend school	3.33	1.45	N
Mean of means= 3.80		**Standard deviation = 1.96**	

The data show a weighted mean of 3.92 and a standard deviation of 1.15 which means that respondents neither agreed nor disagreed on the opinion that parents' ability to support students' education influences their confidence level, and attitudes towards learning. Studies show that children from low socio-economic homes and communities are slow in their development of academic skills compared to their counterparts from high socio-economic backgrounds (Morgan, et al., 2009; Kellet and Dar, 2007; Horgan, 2007; Agyeman, 1993; &Antwi, 1992). They found that initial learning skills correlate with the home environment, therefore, homes where the level of literacy is low affects children negatively.

In the open ended responses students expressed their challenges they face. The data provided by the students show that they faced financial challenges that affect their academic performance in various ways. Some of the challenges relate to their feeding at school or money for transport to school. Students concentrate better in class when they are provided with their needs that are more pressing such as text books and other equipment, pocket money for meals and transport to school. These are the immediate needs of students even before parents think about school fees for the term. The present finding agrees with Agyeman (1993, p.28) who notes that poverty affects a child's 'chances of successes in school'.

When students were given the opportunity to express their opinions on how parents' financial status influences their school attendance, the concerns from students gave evidence that some students failed to go to school because of financial challenges their parents faced.

The data gathered show that some students have to go and sell early in the morning before they could get money to go to school. This is a common practice in some homes, especially among single-parent families. This affects the general performance of students. This is in agreement with Ornstein and Levine (2006, p.323) when they indicated that 'U.S. has not adequately "recognized the need to eliminate barriers to achievement that arise in the family and how lack of resources affects achievement".

The data further indicate that students who owed fees are haunted by the fear that they may be sacked from class at any moment. It means that students' financial hardship interferes with their studies and this can lead to poor performance in school.

However, some students were of the view that their parents' financial status do not really affect them because they knew the problem and therefore were able to manage it. They understood their parents' situation and did not allow it to disturb their studies. However, they try to rely on their friends for some of their educational needs. At least this practice helped them not to worry so much about a problem they could not solve themselves.

Over all, students were unanimous that they neither agreed nor disagreed on how parents' financial circumstances affect students' education in the study area. This is supported by the mean of means of 3.80 and a standard deviation of 1.96. This finding points to the fact that to some extent parents' financial situations affect their children's education in different ways.

In order to gather more data on the financial situation of parents, the researcher asked further questions to ensure that the extent to which parents pay their children's fees is established from the students' own perspectives. The first of such questions was to investigate whether parents pay their children's fees by instalments. The answer was that, 160(53.1%) students indicated that parents pay their school fees by instalments, while 151(47.5%) students said 'no' to the question posed. The data show that more students (53.1%) pay their fees by instalments.

Further probing revealed that 66(22.0%) students have arrears in fees, while 245(78.1%) did not owe arrears in fees. The information gathered through interview of school officials revealed that most students owed fees in arrears from last year. This is supported by these interview data from school bursars:

> *Only a small percentage is able to pay all their fees in a term. The greater majority owe fees in arrears. Some students have accumulated their fees to the tune of two thousand Ghana Cedis. Sometimes, we force them to pay by threatening to sack them from the examination halls but they repeat it the following year.*

Another observed that:

> *Only few students pay outright. So most of them owe fees in arrears and these are those who are about to write their final examination. Whenever they are told to pay, they say, they will pay when they come back for their results.*

The data reveal that majority of students owed fees in arrears to the extent that some students' fees have accumulated over two years. This makes school officials threaten to drive students who owe fees away from examination halls. School officials also suspected that some of the final year students misapply their fees and tried to play tricks on them. A situation like this disturbs students who genuinely are poor and who could not pay even when they were driven away from the examination hall. Hagiwara (2015) observed that one in six Japanese children lives in poverty and the prospect of acquiring a good education is often hampered by their parents' inability to finance their education to High School.

However, further probing revealed that some students refused to pay their fees when the money was given to them by their parents. One of the school officials pointed this out in an interview session. He indicated that '*some students spend their fees because their parents do not have time to follow up to check on them in school'*. This category of students is unlikely to indicate in the questionnaire that they have arrears from last year. This would not give a true picture of the students who owe fees from last year.

The researcher in his quest to find out how school authorities handle students who have difficulty in paying their fees, gathered these pieces of information from school officials. The following are some interview extracts from heads of schools:

> *We have Government scholarship for brilliant but needy students so we apply for them. In addition, some Non-Governmental Organisations (NGO) like Plan Ghana, and MIHA Educational Fund supports some of these students. We also have concerned teachers who sometimes assist some of these students*.
>
> *We used to give scholarships to brilliant but needy students but we are unable to continue the scheme because of financial difficulty. I have to sponsor one of these students who was very brilliant but whose parents could not support him.*

The number of students who benefitted from these scholarships and bursaries were few and the greater majority continue to struggle with payments of fees. Government scholarships meant for brilliant but needy students are sometimes given to students whose parents can afford to pay the fees. Students whose parents have good social capital are able to contact their schoolmates and friends to offer their children government scholarships at the expense of the disadvantaged students.

Private scholarship schemes offer limited help to students because of limited funds. So operators of such scholarship schemes offer few students the opportunity in a year. Private schools in Ghana cannot give scholarships to needy students because they are profit oriented institutions and they only do that with the intention of enticing more students to their schools. It is heartwarming to note that some teachers sometimes sacrifice to pay some needy students' fees. Besides, when these NGOs and churches pay fees for students, they pay only the boarding fees, leaving the other fees unpaid. So the problem is reduced but not solved.

Additional data gathered showed that 74(24.4%) students care for themselves. Ofosu-Kusi (2007) in an interview session found that 92% of the teachers indicated that parents in the district were unresponsive to the educational needs of their children. This situation led many pupils to cater for themselves thereby making it difficult to acquire quality education. This situation agrees with what Chioma et al., (2017) found, that is income level of parents impacts on the academic achievements of children.

In an open-ended questionnaire some students gave reasons why they paid for their own education. The reasons assigned by students for taking care of their own education are true reflections of what is happening in the study area. Some students have the potential but do not have parents with the needed financial support to enable them achieve their ambitions. Some parents shirk their responsibilities towards their children's education as indicated by one of them in the words '*my mother is the only one caring for us'*. This implies that the father has shirked his responsibility towards the children. Ofosu-Kusi (2007, p.191) observed that, while many parents showed concern and responsibility towards their children's education, 'others appear to view it as a detestable chore'. Some parents genuinely do not have money to support their children's education because they are either jobless or under-employed. As a result, some of the students forego classes to work for money to enable them pay for the fees, buy educational materials and even feed themselves.

In response to the question regarding what student do to get money to take care of themselves and their education, the students outlined some of the jobs or activities they engaged themselves in to enable them get money to take care of their education.

The data revealed students engaged themselves in constructional work, pulling fishing nets and being drivers' mates in order to get money. Selling in the market place is equally tedious and lead

students to over stay in the night to sell and so they were unable to wake up early to prepare for school. All these have consequences on their studies and on their health conditions. Some of these activities have lured many good students from the classrooms and they have ended up dropping out of school. This present finding is in agreement with Ofosu-Kusi (2007, p.192) who found that students engaged themselves in 'more strenuous activities on rice and vegetable farms. Perhaps, this present finding is in support of the finding by Chioma, et al., (2017) who found that on the average, Japanese High School students disagreed with the opinion that financial constraint is a determinant for knowing the number of children that will go to school in low-income families. They were however quick to note that it is not surprising since Japan has a compulsory education till the age 15.

Conclusions and Recommendations

The conclusions and recommendations of the study are made based on the findings.

Teachers' admission that parents' financial status affected students' academic achievements in the study area should be a source of worry to all educational stakeholders. The reason is that apart from a small percentage of salary workers and businessmen who can afford to support their students, most parents in the study area are low income earners such as fishermen, fish mongers, petty-traders, artisans and subsistent farmers who were unable to pay school fees and provide for their students' educational needs. This is not good for youth skills development and national development and must be given a serious attention by all stakeholders in education.

The study found that some parents who could not pay their students' fees outright arranged with school officials to pay the fees by instalments. This is commendable and school officials and other stakeholders must educate and encourage parents on the need to save towards the education of their children. This will give students from low income homes the peace of mind to concentrate on their studies while their parents take time to honour their responsibilities towards them in school.

It was found that 24.4% of the students cared for their own education. This implies that this category of students did not have people to support them achieve their educational ambitions and therefore took up the responsibility themselves. In a situation like this unless government or philanthropic organisations lend their support a good number of these students may drop out of school.

The following recommendations are made**:**

1. The revelation that most parents did not have employable skills is worrying. Therefore, the Ministry of Education and GES must intensify skills development of the youth in school such as carpentry, fashion designs, welding and fabrication in order to equip the youth with skills during their school days and also repackage some of the National Service Schemes to meet such training needs. This requires that government increases its Skills Development Fund (SDF) for the Council for Technical and Vocational Education and Training (COTVET) to carter for this important programme, for today's youth, are our future leaders.
2. The revelation that most parents have difficulties in paying their children's' fees and providing their educational needs is a disturbing situation. It is, therefore, recommended that stakeholders of education such as Metropolitan/Municipal/District Assemblies, NGOs, churches and other stakeholders take up the responsibility of educating parents on the need to cultivate the habit of saving. This can be through daily savings ("susu"). This will enable low-income earners to access loan in times of need to support their children's education.

3. In cognizance of schools' official admission that students who owed fees became psychologically disturbed and were unable to concentrate on their studies calls for students' counselling in schools to assist students who have such difficulties.

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Mathematizing Mathematics in Holy Writ

Nixon Saba Adzifome

Department of Basic Education, School of Education and Life-Long Learning (SELLL), University of Education, Winneba

Abstract

Studies have unraveled and given exposition on mathematics inherent in Holy Writ, the Bible. This study provides further evidence of more implicit and explicit mathematics in its words, verses and chapters. These are furnished through document analysis and purposeful mathematizing and explication of a selected host of Biblical texts and contexts to demonstrate their mathematical nature and worth. It reveals mathematics, some amenable to formulation, are embedded in the texts and underlie the contexts of scripture. It further reveals, among others, that internal logic, coherence and fact-validation, and diversity of content areas that match 21st century curriculum characterize mathematics in the Bible. Recommendations were made for faith-based Christian schools to incorporate mathematics in biblical context into their curriculum and for this study to be replicated with other religious texts.

Keywords: Biblical patriarchs, characteristics of mathematics in the Bible, Years of human existence on Earth

Introduction

Mathematics is pervasive and underlies all human activities. It is used "to explain and interpret phenomena and experiences" (NaCCA, 2019, p.v). Its power lies in the use of formulations to understand, control and predict reality. Scientists agree with Pythagoras and Galileo that the universe is written in language of mathematics and governed by its principles (Brown & Porter, 2017; Tegmark, 2008; 2014). D'Ambrosio (2001) explains mathematics as an accumulated discovered knowledge; *"a wonderful mosaic of cultural contributions" (p. 311).* The pervasiveness of mathematics presupposes that Holy Writ, the Bible, has mathematical value that require exploration. As non-traditional source of mathematics, there is low expectation of the sophistry of mathematics it embeds. Studies have unraveled and given exposition on mathematics in the Bible (Adejumo, 2018; Christensen, n.d.; Matiki, 2014; Price, 2012; Shalman, 2009). Further evidence is required of yet–to-be-unraveled mathematics ideas in the Bible for better appreciation or evaluation of its mathematical nature and worth.

Literature Review

To 'mathematize' or 'mathematicize' is to reason mathematically; perform mathematical calculations or adopt mathematical approach; consider or treat mathematically; reduce to mathematical term or form or subject to mathematical treatment (Merriam-Webster, n.d.; Oxford English Dictionary, 2023). To mathematize implies coming up with the mathematical element in something or make a context/situation amenable to mathematical formulation and treatment. Tout (2014) describes it, based on Organization for Economic Cooperation and Development [OECD] model, as involving identifying mathematics in context, formulating, interpreting, evaluating the outcome and reflecting on it application and fit with real world situations. To characterize is to identify peculiar features of something. Characterizing mathematics in the Bible amounts to unravelling its peculiar mathematical nature.

Studies have highlighted mathematics in biblical texts (Adejumo, 2018; Baker, 2016; Christensen, n.d.; Matiki, 2014; Price, 2012; Shalman, 2009). Much effort had focused on unravelling mathematics related to the ages of biblical patriarchs in Genesis 5 and 11 with the aim to explicate their long ages and resolve literal/symbolic interpretation controversy (Kvasnica, 2005). Matiki (2014) unveiled 10 mathematical ideas/concepts in "words and passages from the Bible which have a mathematical character infused in them" (p.2055). He interpreted contentment as balance; amen as an axiom; "as far as the East is from the West" as infinity; the word of God as wheel and knot with no ends and formulated books with common biblical themes as: f (book) = n + k22, where n is the numerical position of the book in the Bible and k, a whole number constant. He unveiled GOLGOTTA as deriving from cryptographic mathematics, explicated the spiritual significance of 2,3, 4 and 12; illustrated the relation between Jesus and God as a set with two different names, the word of God as Boolean dichotomous logic rather than fuzzy logic, algebraic transitivity and the idea of exponential increase. Adejumo (2018) formulated Leviticus 26:8 to provide proportional equations that demonstrate the exponential effect of group performance.
The already unveiled mathematics ideas are pointers to the effect that more careful and thorough efforts would yield more.

Statement of the Problem

This study's premise is that mathematics is pervasive, thus in the Bible. Primary evidences exist. Mathematics instantly conjures up numbers. 'Numbers' entitles the Bible's fourth book; a Greek translation of its Hebrew title "Bemidbar" meaning, "wilderness" (Editorial Safeliz, 2015, p.114). This translation seemed informed by the "**census [**enumeration**]**…according to the ***number***" of males "***twenty years and above****"* in the wilderness of Sinai "on the ***first day*** *of the* ***second month****, in the* ***second year*** [emphases mine] after they had come out of Egypt" (Numbers 1:1-3). The emphasized words are numbers and mathematical. The creation account (Genesis 1:1-2:3) furnishes ordinal numbers, thus, cardinal numbers (1-7) implying counting, ordering and number base (seven).

Revelation 13:18 reads: "*Here is* ***wisdom****. Let him who has* ***understanding calculate*** *the* ***number*** *of the beast, for it is a* ***number of a man***: *His number is* ***666*** [emphasis mine]". 'Calculate', 'number' and '666', a palindrome, are explicitly mathematical. The "***number of his name****"* (verse 17) denotes cardinal number, connotes nominal number and implies the alphanumeric nature of the Greco-Roman and Hebrew numerals. Perceptively, it objectivizes "number" as "wisdom" and those able to calculate as having "understanding". Coincidentally, developing 'number sense' is a goal pursued in school mathematics (Greeno, 1991; McKinney, 2023; Park & Brannon, 2014).

Literature reveals a beautiful Bible-based mathematical idea. The ratio of letters to words in each of two creation verses, Genesis 1:1 and John 1:1, in their original languages, Hebrew and Greek, results in two constants π (Pi) and e (The base of natural logarithm) respectively and in Euler's identity, $e^{i\pi} + 1 = 0$; considered "the most beautiful theorem in mathematics" (Barker, 2016). Studies that explored mathematical ideas in the Bible are few (Adejumo, 2018; Baker, 2016; Christensen, n.d.; Matiki, 2014; Price, 2012; Shalman, 2009) and are in no wise exhaustive. Much more effort is required to add to the existing unraveled ones for better appreciation and evaluation of the mathematical nature and worth of the Bible. As well mathematics in the Bible needs some characterization to afford the appreciation of its relatedness to mathematics in the 21st century.

This study therefore further mathematizes the holy Writ for mathematical elements in its texts and contexts.

Research Purpose/questions

This study's traction is to unravel more mathematical ideas in the Bible and characterize them. The Bible was subjected to document analysis, mathematized and characterized to address two research questions as follows:

1. What unexplored implicit and explicit mathematics ideas, concepts, or principles are embedded in texts and underlie contexts of Holy Writ?
2. What characterizes mathematized mathematics in Holy Writ?

Holy Writ in context

Holy Writ designates the Bible or any writing or utterance with unquestionable authority (Merriam-Webster, n.d.). World religions have sacred books that provide historical accounts, expositions on object of worship and principles guiding expression of beliefs and practices. These are read for insight, revelation, fulfilment, hope, comfort, prosperity, and enlightenment and progress. In Christianity, the Bible serves these purposes. It is a conglomeration of Jewish religious canon, the Tanakh (White, 2021) and later derivative canons by the apostles of Jesus Christ under inspiration (The Best Schools, 2021). It has 66 books. The King James Version (AD 1611) is regarded as the closely translated version of the original texts and "the most printed book in the history of the world" (Fairchild, 2018). The Bible, also referred to as scripture, in the past served as curriculum for religious and moral instruction and considered divine truth, the blue-print for judging scientific and intellectual discoveries (White, 2000; O'Connor & Robertson, 2002; Pace, 1909).

Methodology

This is a documentary research informed by the interpretivist paradigm that views reality as a construction of the human mind and knowledge and meaning as deriving from interpretation (Schwandt, 1994). Revealed or inspired, the Bible reflects the minds of the writers, thus subject to analysis and interpretations. The Bible is a historical as well as a sacred document. Its authenticity is presumed in this study thus no attempt was made to validate it as a researchable document. The New King James® Version (NKJV), copyrighted by Thomas Nelson International in 1982 was used. It was chosen for its clarity of language and retention of units of measures in the original texts.

This study employed document analysis. This refers to an in-depth reading of a document and analyzing the texts therein to achieve the research intention (Bowen, 2009). In this study, the document analysis involved intense reading, re-reading and interpretation as well as mathematizing- formulating and explicating mathematical ideas embedded in the text and context of the Bible. Thus, the Bible was perused and spotted texts and contexts with implicit and explicit mathematical ideas were highlighted, read carefully, re-read and interpreted. These were then formulated, expressed and explicated through textual, symbolic or diagrammatic representations (tables) or a combination of these. The unraveled ideas were then characterized. In reporting, portions of the Bible, current geographical statistics, and created examples were drawn on.

Results and Discussion

In this section, the unraveled mathematical ideas and their characteristics are presented, explicated and discussed. This study neither exhausts the mathematical ideas in the Bible. What is derivable is a function of the technical expertise, reading depth, speed and duration among others. The results are presented in accordance with the research questions and discussed.

Results

Mathematical ideas and concepts in Holy Writ

1. Genesis 5:1-32; 11:1--32: These furnish data of the ages of Adam and his descendants for statistics. Measures of central tendency, dispersion and relative position are calculable. Lifespan across eras, contemporaneousness of the biblical patriarchs and years of human existence on Earth are inferable from the data pattern. It beckons conjecture God intended Adam to live to 1000 years to be immortalized (see Isaiah 60:22; 65:20; Titus 1:2; 2 Peter 3:8; Revelation 20: 4, 5). Adam lived 930 years; 70 years short of this conjectured time. The antediluvian lifespan was pegged at 120 years due to inappropriate marriages (Genesis 6: 2, 3). By David's time it reduced to 80 years [70+10 years] (Psalm 90:10). Interestingly, subtracting the verse from the chapter gives 80! Data from Genesis 5 is presented in Table 1.

Table 1: Data from Genesis 5

	Adam	**Seth**	**Enosh**	**Cainan**	**Ma'lel**	**Jared**	**Enoch**	**Methu'**	**Lamech**	**Noah**
AB*	130	105	90	70	65	162	65	187	182	500
YB*	800	807	815	840	838	800	300	782	595	450
Lifespan	930	912	905	910	895	962	365#	969	777	950

AB= Age at Birth; YB= Years after Birth * …of first son [or one under consideration]; # Enoch was translated.

There are palindrome, pronounced "pal-un-drohm" (Buffington, 1985, p.67), ages (838, 595, 969 and 777) and outlived patriarchs are determinable from Table 1. Methuselah outlived Lamech (782yrs -777yrs) = 5 yrs. Also Human Existence (HE) on Earth (up to a named patriarch) is formulable as:

$$\sum AB_{PRE} + LS_{PER}$$

AB_{PRE} is age at birth of preceding patriarch(s) and LS_{PER} is the lifespan of patriarch under consideration.

Thus, if life had ended with Noah, Human Existence (HE) would have been only 2006 literal years.

2. Genesis 11: Data in Genesis 11 also furnish palindrome, 464 (Eber's lifespan). Shem outlived Aphaxad 62 years, Eber outlived Preleg 191 years and Sureg outlived Nahor 52 years. Estimating Jacob's age when he gave birth to Joseph as 97 years (see Tables 3 and 4) and applying the HE formula yields 757 years, a palindrome (i.e. if life started with Shem and ended with Joseph). Data from Genesis 11 and those scattered in the same Book are displayed in Tables 2 and 3.

Table 2: Data from Genesis 11

	Shem	A'xad	Salah	Eber	Preleg	Reu	Serug	Nahor	Terah	Abram
AB*	100	35	30	34	30	32	30	29	70	100$
YB*	500@	403	403	430@	209	207	200@	119	135#	75#$
Lifespan	600	438@	433	464	239@	239	230	148@	205	175$

AB= Age at Birth; YB= Years after Birth * …of first son [or one under consideration] Out-lived by parents: YB > Lifespan of son (consecutive @); #: Derived; $=Not in Genesis 11.

Table 3: Scattered Data in Genesis

	Isaac	Jacob	Joseph
AB*	60	97$	30
YB*	120#	50#	80#
Lifespan	180	147	110

AB= Age at Birth; YB= Years after Birth * …of first son [or one under consideration]; $ =Estimated; # = Derived

The genealogies reveal diminishing mean lifespan across the eras. These are: Adam to Noah (10 generations, if Enoch had attained 1000): 921; Adam to Noah (10 generations; with Enoch translated): 857.50 2dp; Shem to Abraham (10 generations): 317.10 2dp; Shem to Joseph (13 generations): 277.54 2dp; Isaac to Joseph (3 generations): 145.67 2dp]. Applying the HE formula ($\sum AB_{PRE} + LS_{PER}$) to the eras yields 2,313 years (If life stated with Adam and ended with Joseph) and this is verifiable arithmetically [(2,006-450) + 757 = 2,313 years; 450 being years Noah and Shem were contemporaneous].

3. Determining when a forbearer patriarch died (FPD) relative to a named patriarch is formulable as:

$$[YB_{FP} - [\sum AB_{PRO}]$$

YB_{FP} is years after birth of forbearer patriarch and $\sum AB_{PRO}$ is the sum of ages at birth of proceeding patriarchs up to a named patriarch.

For interpretation, a positive value is "years after" and a negative one "years before" the named patriarch's son' birth. Thus, Methuselah died when Shem was 100 years and the very day Aphaxad was born: 782−(182 + 500 + 100) = 782−782= 0 or 100−100 = 0. Adam died when Lamech was 56 years old or 126 years to the birth of Noah: 800−(105 +90 +70 + 65 + 162 + 65 + 187 + 182) = 800−926 = − 126 + 182=56 or 182− 56 = 126 and Shem died when Jacob was 50 years old or 47 years to birth of Joseph: 500−547= −47+ 97= 50 or 97−50 = 47.

4. Estimation of Jacob's age at birth of Joseph has embedded mathematics. It involves estimation, subtraction, addition, coordinates {(0, 97), (30, 127), (33, 130), (50, 147)} and linear equation: $y = x + 97$. The estimate is presented in Table 4.

Table 4: Estimate of Jacob's Age at Birth of Joseph

Event	Birth of Joseph	*Before Pharaoh*	*Both before Pharaoh*	Death of Jacob	Death of Joseph
Jacob's age (y)	97#	127#	***130**** (Genesis 47:9)	*147**	
Joseph's age (x)	0#	***30**** (Genesis 41:46)	33#	50#	*110*#

[Subtract Joseph's 33, age he stood before pharaoh (Genesis 41:46) plus third year of famine (Genesis 45:6), from Jacobs' 130, when both were before Pharaoh (Genesis 47:7-9). *Provided in the Bible; # Derived.

Thus, Reuben was at least 6 years older than Joseph [Both were born within 20 years Jacob lived with Laban and Leah gave birth to Reuben after 14 years of marriage] or at most 35 years (97yrs-62yrs) older than Joseph. Jacob gave birth to Reuben, at least, age 62 [His twin brother married at 40 plus 21 years of service to Laban]. There were ten births between Reuben and Joseph plus periods before seed taking] (Genesis 26:34; 27:1; 29:15-32).

5. Genesis 16:16; 17:17, 24-25; 21:5; 23:1-3; 25:20: These enable verifying Abraham's age at different times relative to the ages of his wife and children and spotting seeming discrepancies. Ishmael's age at death of Sarah is determinable. It suggests setting up an equations but sequencing allows for various inferences at a go as shown in Table 5.

Table 5: Sequence of Abraham's Age Relative to His Family Members

Event/ Person's Age	At circumcision	Isaac born	Sara died	Isaac married	Abram died	Ishmael died	Isaac died
Abraham's Age	99*	100*	137#	140#	175*		
Sarah' Age	90! [89]	90*	127*				
`Ishmael' Age	13*	14#	51#	54#	89#	137*	
Isaac's Age		0	37#	40*	75#	123#	180*

* Provided in the Bible; # Derived. ! Source of error; [ ] Should be for accuracy

There is a margin of error of 1 year between Abram's self-stated age (Gen. 17:17) and narrated age (Gen. 17: 1, 24).

6. Genesis 18: Abrahams' intercession for Lot with God yields number pattern: 50, 45, 40, 30, 20, 10 in realistic context. The nth term is determinable. Treating 45 as 'outlier' furnishes: 10(5), 10(4), 10(3), 10(2), 10(1) with a common difference of -10 and nth term: $10(6-n)$. Properly interpreted, $\{1 \leq n \leq 5\}$ fits the realistic context though theoretically can assume any integral value. The sum to the nth term is $\frac{n}{2}(110-10n)$. The *45,* is between the 1st and 2nd term thus formulable as: $10\left[6-\frac{1}{2}(n_1+n_2)\right]$. Thus, beyond plea and bargaining, Abram and God had discourse on mathematical sequence.

7. Exodus 16; 18: Exodus 16:16-21 reveal explicitly the trilogy of mathematics relations-equal to [=], less than [<] or more than [>] an omer of manna and "*twice as much*" [2 omers of manna]. In Exodus 18, Jethro's advice to Moses yields a number pattern: $1000, 100, [50], 10$. Eliminating the 'outlier', 50, furnishes geometric sequence: $10^3\ 10^2\ 10^1$ with common ratio 10^{-1} and nth term 10^{4-n}. In realistic context, $\{n: n < 4\}$ though n can theoretically assume any integral values. The sun to the nth term is $\sum 10^{4-(n!)}$ or $\frac{1000[1-10^{-n}]}{0.9}$.

The sum to infinity leads to conjecturing a theological interpretation for 10000/9 = 1111.1111… as a refutation of self-centeredness, the "I" syndrome. The reason Jethro counselled Moses to devolve power and function. The twin exquisite sequences [6 and 7] converge, involve 'outliers' and negative reciprocals (additive and multiplicative) as common difference and ratios respectively. Both have distractors and require mathematical audacity, knowledge of mathematical patterns, indicial laws and ability to generalize. While Genesis 18 furnishes an arithmetic sequence and Exodus 18, a geometric sequence. The formulating 'outliers' and the sums to infinity reveals their nuanced differences.

8. Exodus 25-28: The earthly sanctuary embed mathematics. The shapes, positioning and crafting of equipment and furnishings embrace mathematics of design and construction engineering. It involves measurements- mass, weight, length (perimeter), area, volume and angles; requires mathematical skills and processes such as visualization, drawing, calculating, measuring and mathematical dispositions (in constructing). The sanctuary demonstrates relatedness and dependence of quantity on quality (see 1 Chronicles 28:16-19). Difference in quality results in categories thus nominal data; ordering these results in ordinal data and calibrating, yields interval and ratio data.

9. Leviticus 24:5-6: This relates: "*bake twelve cakes" from fine flour. "…Two-tenths of an ephah shall be in each cake*" (vs 5). Fraction as operator and multiplication are evident. One ephah makes 5 cakes i.e. $5 \times \frac{2}{10} = 1$. Two (2) ephahs yields 10 cakes and $2\frac{2}{5}$ ephahs, 12 cakes (ie. $12 \times \frac{2}{10} = 2\frac{2}{5}$) . An ephah is 22 liters (of dry goods) (Editorial Safeliz, p1130). This also means $22 \times 2\frac{2}{5} = 52\frac{4}{5}$ liters (dry goods). The cake are set "in two rows, six in a row'' on a table. This models multiplication 2 x 6 =12. The 2, multiplier; 6 , multiplicand and 12, product.

10. Deuteronomy 3:11; Revelation 21:7; Judges 20:10: The size of Og, "*remnant of the giants*" and King of Bashan's bed, suggest the stature of antediluvian men or mankind at creation: "Nine cubits in length and four cubits" [4.5m] (Deuteronomy 3:11). Comparing his height to that of an angel: "…one hundred and forty-four cubits [72m] (Revelation 21:7) yields a ratio of 9:72 = 1:16. The proportional equation: $\frac{10}{100} = \frac{100}{1000} = \frac{1000}{10000}$ in Judges 20:10 yields a ratio of 1:10.

11. I Kings 18:18-19, 22: Number, numerals and ratio in "*the four hundred and fifty prophets of Baal, and the four hundred prophets of Asherah*"; implies arithmetic operations and inequality. Ratio of Baal to Asherah prophets was 45:40 or 9:8. Types of ratios are demonstrable. The Baal prophets were 9/8 of Asherah's and Asherah's, 8/9 of Baal's [Part-part ratios]. Likewise, Baal and Asherah prophets were 8/17 and 9/17 respectively of the total number of prophets (950) [Part-whole ratios].

12. 2 Kings 20:1, 8-11: Ten degrees angle is mathematical. Shadow formation, angular rotation, relative movement between the Earth and the Sun and 'sundial of Ahaz' (vs 11) imply Mathematical Physics. A sundial is a device that tells time using the position of the Sun (Rohr, 2012). In its rustic form, it was a pole and calibrated flat ground. Shadows cast by the positioned pole tells the time. Dependent on Sun, it accounted for part or the whole 12 hours of day. The narrative is mathematically drenched though meant to prove divine power through cosmic disturbance.

The shadow going 'down' [forward], moving from east to west, and 'backward', moving from west to east, imply anti-clockwise and clockwise rotations respectively relative to the base of the pole for a viewer located between the pole and the rising Sun from the east. As the Sun appears on the horizon, the pole's shadow lengthens (magnifies). It shortens and turns in an anti-clockwise direction as the Sun rises. When directly overhead, the pole's shadow shortens disappearing under its foot. So, as the Sun sets, moves in the anti-clockwise direction, the shadow also moves in the anti-clockwise direction. A further fall of ten degrees in same direction will appear normal however a rise (clockwise rotation) is obviously abnormal; an indication of apparent reversal of the Sun. This accounts for Hezekiah argument: "*It is an easy thing for the shadow* [of pole] *to go down ten degrees*; *no, but let the shadow [of pole] go backward ten degrees.*" (vs10). Ten degrees in verse ten! The shadow indexes the Sun's apparent movement.

Unintended information is supplied- Ahaz, an inventor and Hezekiah knew sundial-related mathematics (vs 11) and ten degrees turn as sign of supernatural occurrence (see Isaiah 38:22). Sundials accounted for the 12 hours of day and watches, 24 hours of night. Watches were manned by sentinels [watchmen] who run four three-hour shifts. Thus in the Bible we have first watch [6pm-9pm], second watch [9pm-12pm], third watch [12am-3am] and fourth watch [3am-6am]. In the "*fourth watch*" [3am-6am], Jesus walked on the sea (Matthew 14:25). Thus, sundials and watches calibrated the 24 hours. Modern watches (time devices) derived their origin and names from these phenomena! (see Psalm 63:6; 119:148; Lamentation 2:19).

13. Ezra 6:17; 7:9 8:35: These texts present pie-chart tasks. Ezra 7:9 presents calculation of time duration and time conversions. Ezra's travel time from Babylon to Jerusalem: "*first day of first month*" to "*first day of fifth month*" gives estimate of travel time via horse between two ancient cities as 120 days or 4 months [using 30 days per month, not average of $29\frac{1}{2}$ on Jewish calendar]. This could be compared to travel time by air and road in modern times.

14. Ezekiel 48:30-35: The sketch of a map from the description of the division of the land of Israel amongst the tribes of Israel. This passage require visualization, reading ability, geometric reasoning, and drawing skills. It involves the four compass points-North, South, East and West of a square city called "THE LORD IS THERE" with length 4500 cubits. A fitting starting point for ideas of relative positions and bearings. The perimeter, "*All the way round*" (vs 35), is 4(4500) =18000 cubits. The area is $4500 \times 4500 = 20{,}250{,}000$ square cubits. The city with three gates on each side models a multiplication sentence ($4 \times 3 = 12$) and affords labelling of parts- '4' multiplier; '3'multiplicand and '12' product.

15. Zachariah 1:7; 2:1; 5:2: These furnishes three ordinal numbers, a mathematical instrument, measuring line [measuring tape/rule] "*to measure Jerusalem*", a city with 'width' and 'length'. (Zachariah 2:1, 2). Also, an area problem of a rectangular sheet (scroll) with dimensions 20 cubits

by 10 cubits [thickness negligible] (Zachariah 5:2) requiring identification of dimensions and calculation as: $10m \times 5m = 50m^2$.

16. Matthew 20: This reveals ancient working hours as 12 hours per day (dawn to dusk) which roughly coincides with 6am (1st hour) to 6pm (12th hour) respectively. Thus, 12 hours of day and equivalent 12 hours of night validates the 24 hours in a day concept of time. This concept underlies invention of sundials; confirms days as literal in Genesis account of creation and the idea of night preceding day-they worked from rest, not rest from work. In this, Christ's death and resurrection 'in three days' finds meaning and validation. His death straddled three days-three hours of Friday [3pm-6pm] (Mark 15:34); 24 hours of Sabbath [6pm-6pm] (Mark 15:42; 16:1) and 12 hours of Sunday, very "early in the morning on the first day of the week" [6am] (Mark 16:2). Spectacular events occurred-the Sun's refusal to shine from 12 noon to 3pm, temple veil ripping and a Roman soldier exclamation "*truly this man was the son of God*" (Mark 15: 33-39).

17. Mark 12:41-44: Jesus "*sat*" vertically opposite and "*saw*" possible trajectory of "how" money got into the treasury-transversal line, parabola or hyperbola? It presents a fraction puzzle. Mathematically, the old widowed woman gave all [relative to herself], a whole, "*whole livelihood*" but the Pharisees [relative to themselves] gave a fraction "*out of their abundance*"; part of their whole possessions. Thus, $1 > a/b\,, \{a < b, b \neq 0, a, b \in Z^+\}$. If "a quadrans" ["farthing"] is interpreted as one-quarter, she had given one-fourth of the currency unit. If 2mites = 1quarter, then, 2mites X 4 = 1quarter X 4=1unit. Therefore, 8mites = 1 unit. If it were US Dollar, then she gave 0.125 USD. Fraction is a relative concept, more especially when decontextualized.

18. Mark 14:1-8; Matthew 20: This presents present-value costing and valuation problem. The woman poured "*more than three hundred denarii*" (Mark 14:5) spikenard oil from an alabaster flask on Jesus. Mathew 20:2 supplies information. The daily wage was 1 denarius (singular) for approximately 12 hours of work in then Jewish economy. Thus, 300 denarii imply 300days. Adding up 52 days she kept the Sabbath (52 weeks in a year) yields 352 days, almost a year's (less 8 days) wage. Ben-David (2021) reports:

> The minimum wage in Israel stands at a monthly NIS 5,300 ($1,500), or NIS 29 ($9.2) an hour. It will rise to NIS 5,400 by April 2022, and increase every year until 2025 when it will hit NIS 6,000 by December, according to the announcement

Based on the 2021 hourly rate, the value of the gift to Jesus comes to 12 X 9.2 X 300 = $33,120. The oil cost more- "more than". The flask adds value to her gift. Alabaster flask is made from a soft stone thus, required tact, delicateness, intense concentration and time to produce.

19. John 3:16; I Timothy 3:16; Mark. 16:19-20: John 3:16 provides explicit logical tools and implicit symbols. Negation, conditionality, and implication statements are derivable.

Portions of John 3:16	Description	Elaboration
For God so loved the world	Given statement $[l]$	Major premise/Simple statement
That He gave His only begotten Son	Implied statement$[l \rightarrow g]$, $\sim (g \rightarrow l)$ [NIMP]	Minor premise 1 /Compound statement
That whosoever believe in Him	Conditional statement $[b]$	Minor premise 2 Conditional/Compound statement
Should not perish (Negation of perish p)	Final implication $[b \rightarrow \sim p]$ and $[\sim p \rightarrow b]$	Conclusion $[\sim p]$
But have everlasting life	Negation$[\sim p = e]$, thus, $[p = \sim e]$	Conclusion $[e]$

1 Timothy 3:16 provides a logical puzzle- "*mystery of godliness*". God was: a. Manifested in the Flesh b. Justified in the Spirit c. Seen by Angels d. Preached among the Gentiles e. Believed on in the world and f. Received up in Glory. These require re-ordering as: b, c, a, e, f and d to make logical sense. Mark 16:19-20 confirms a, e, f and d implying rendering in the former as a list of mystery characteristics than a logical ordering. The verses and chapter numerical rhyme: 3:16; 3:16 and 16.

20. Revelation 1-15: Conjecturing, equivalence and matching is involved in the seven churches/angels (Rev.1:20), seven lamps of fire/spirits (Rev.4:5), seven horns/seven eyes of God (Rev.5:6), seven seals (Rev. 6-7), seven trumpets (8-9; 13:15-19) and seven plaques (Rev. 15:1.6, 8; 16). This repetition leads to conjecturing of seven as symbolizing completeness/perfection thus, a unique denominator. Division of single-digit natural numbers by 7 leads to a beautiful conclusion. The digits after the decimal point do not repeat same numbers and excludes 3, 6 and 9. Aside 5, 7 is the only number with no factor or multiple among the set of ten single-digit Hindu-Arabic numerals. Its divisibility rule is relatively complex-continuous subtraction of twice the last digit from the rest of the digits till zero or seven (positive or negative) or its multiple is obtained.

21. Revelation 6:6 [Compare 2 Kings 7:1, 18]: "*A quart of wheat for a denarius, three quarts of barley for a denarius…*" Rendering "quart" as quarter, imply fractions: $\frac{1}{4}$ and $\frac{3}{4}$ and their multiplicative relationship: $3 \times \frac{1}{4} = \frac{3}{4}$ and additive relationship: $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$. The ratio of wheat to barley for the same amount of money is 1:3. How many quarts of equal quantities of wheat and barley can 108 denarius buy? (4D × Qty) + ($\frac{4}{3}$ D × Qty) = 108D. Qty × $5\frac{1}{3}$ = 108= 20.25 (units each). How much is needed for a household for one week if their daily intake is 2 quarts of wheat and 2 quarts of barley? 7[(2 × 1) D + (2× $\frac{1}{3}$) D] = 18.67D 2dp. It involves fraction arithmetic operations, ratio, and equations and provides context-based mathematics problem.

22. Revelation 12:3, 4: These texts state: "*His tail drew a third of stars of heaven [angels] and threw them to the earth*". This embraces unit fraction, fraction as a set and as an operator [one-third of] and presents an estimation problem- determining the **minimum** number of angels

created by God. Revelation 5:11 renders it "*ten thousand times ten thousand, and thousands of thousands" of angels*. This is estimable as: [10,000 × (10,000 + (1,000 × 1,000)] =10,000 × (10,000 + 1,000,000) = 10,000 × 1,010,000= 10,100,000,000. [Ten billion and one hundred million]. Also estimable as: (10,000 × 10,000) + (1000 × 1000) = 100,000,000 + 1,000,000 = 101,000,000 [One hundred and one million]. This figure seems probable as Daniel 7:10 renders it: "*A thousand thousand ministered; Ten thousand times ten thousand stood before Him*". [(1000 × 1000) + (10000 × 10000)] = [1,000,000 + 100,000,000] = 101,000,000. This constituted two-thirds of angelic host. One-half of this yields 50,500,000 [Fifty million and five hundred thousand]; giving a ratio of unfallen to fallen angels as 2:1. In sum, the **minimum** number of angels comes to 151,500,000 [One hundred and fifty one million and five hundred thousand]. Based on UN estimates, this figure is between the 2023 population figures for Bangladesh, 172,954,319 and Russia, 144,444,359 (Worldometer, 2023).

23. Revelation 21: Geometric properties of descending cube "*city of God*", with same dimensions and perimeter "*twelve thousand furlongs*" measured with a "*reed*" [rod] and viewed from an angled position-"*a great and high mountain*". Its wall, 144 cubits high. The city has length 3000 furlongs [fl.]; area, 90,000,000 sq. fl. and volume, 27,000,000,000 cubic fl. Conversion reveals its modern-era reality. A furlong, from "furrow-long," is 201.1680 meters (m) or one-eighths of a mile (mi) (Britannica.com, n.d.). The perimeter of the city is 1500 mi [i.e.12000/8]. It has length 375 mi [i.e.1500/4]; area, (375 × 375) sq. miles [**140, 625 mi^2**] and volume, (375 × 375 × 375) cubic miles **[52, 734, 375 mi^3].** The height of 375 mi (603504 m) is **727** (nearest whole; a palindrome) times taller than Burj Khalipha, the tallest building in the world (829.8m). The area is about 3000 **mi^2** bigger than Germany and 4000 **mi^2** smaller than Japan. This text embraces measurement, 3-D geometry and visualization.

These 23 itemized texts or combinations of texts reveal that mathematics, some amenable to formulation, are embedded in the texts and underlie the contexts of scripture. Their characteristics follow.

Characteristics of Mathematics in the Bible

The texts and contexts reveal mathematics in the Bible is characterized by principles, elements, operations, problems and process skills; logic, internal logic, coherence and fact validation; equipment and diversity of content areas. Evidence of these are provided.

1. Principles: These include equivalence, ordering, proportionality and dimensionality. Equivalence is in equations (HE and FPD formulas); inequality/ordering, in non-equivalence contexts (Mark 12:41-44; Genesis 5; 11); proportionality, in equated equivalent ratios (Judges 20:10) and dimensionality in points, line (length), area (length and breadth) and volume (length, breadth and height) with possible extension to the fourth dimension, "strength", an attribute of God (Rev. 5: 12).

2. Elements: These are specific mathematical ideas or concepts; not members of a set. Numbers as ordinal and cardinal, number bases (seven and ten) and palindromes; numeration system thus counting and calculation (see Genesis 5; 11; Revelation 13:18); arithmetic and geometric sequences/series (Genesis 18; Exodus 18) and logic, logical pattern and puzzle (John 3:16; I Timothy 3:16). Also, mathematical formulas (implicit) (Genesis 5, 11; Exodus 18; Leviticus

26:14-28); statistical data-calculations, representation and interpretation (Genesis 5, 11; Exodus 18); chance (I Samuel 6:9); fractions, ratio, proportion, percentage, equations and inequalities (Mark 12:41-44; Judges 20:10); measurements and measuring units; 1, 2 and 3-dimesional geometrical shapes and ideas; angles in angular rotation (Revelation 21; 2 Kings 20:1-11); costing and evaluation (Mathew 20; Mark 14:1-8].

3. Operations: Explicit operations such as addition, ["add"] (Rev 22: 18); subtraction, ["take away"] (Revelation 22: 19); multiplication, "multiply" (Leviticus 26:9); division, ["divide"] (Exodus 21: 25); fraction as operator, ["a third of"] (Rev. 12:3) and implicit exponential operation (squaring) (Leviticus 26:14-28) and number [verb, implying count] (Exodus 1:18).

4. Problems and Process Skills: Explicit mathematical problems- calculating for 666 (Revelation 13:18); Fraction and measurement in baking (Leviticus 24:5-6); sundials/mathematics physics (2 Kings 20:1, 8-10) and costing of spikenard oil (Mark 14:1-8) and many implicit ones (see Genesis 18; Exodus 18) are in the Bible. Problems require human solution thus invoke deployment of mathematical processes (used by people to solve problems). An auto-ethnographic reflection on the mathematizing involved in this study indicates process skills such as conjecturing, visualizing, formulating, generalizing, symbolizing, calculating, estimating and tabulating among others.

5. **Logic, Internal Logic and Fact-Validation:** Logic, in terms of tools, symbols (implied) and games [John 3:16; 1 Timothy 3:16 and Mark 16:19-20], internal logic [Gen 5, 11], mathematical coherence [Genesis 18 and Exodus 18; Ephesians 3:18 and Revelation 21] and fact-validation [Daniel 7:10 and Rev. 12; Mathew 20 and 2 Kings 20:1, 8-10; [Genesis 5 and 11].

6. Equipment and Devices: Mathematical equipment/devices include measuring rods/reed (Revelation 11:1; 21:15, 16), scale for quarts/measures (Revelation 6:6) and sundials [time, angles and shadow formation] (2 Kings 20:1). Isaiah 40:12 gives a list of such instruments.

7. Diverse Content Areas: Content areas include number (and numeration), algebra, geometry and measurement and data and chance and engineering mathematics/mathematical physics and logical puzzles. These are shown in Tables 6-10.

Table 6: Number and Numeration

Bible Texts	Ideas/Principles/ Strategies/Concepts
Genesis 14:20	A "tithe", 'a tenth'; symbolized 1/10 or 0.10 or 10%. Decimal expressions-ten as base for Hindu-Arabic numeration
Genesis 15:13-16	Division problem (A generation approximately100 years) and terms-dividend, divisor and quotient.
Genesis 41:34	Joseph's formula: $\frac{1}{5} \times 7 = \frac{7}{5} = 1\frac{2}{5}$
Genesis 47:24	Fraction addition and concept of one whole: $\frac{1}{5} + \frac{4}{5} = \frac{5}{5} = 1$
Exodus 30:23-24	Ratio for four components of anointing oil 2:1:1:2 (myrrh: cinnamon: cane: cassia)
Leviticus 22:14; 23:12	$\frac{1}{5}$ and $\frac{2}{10}$ respectively; equivalent fractions
Leviticus 25:8,10	$7\times 7 = 49$; Jubilee: 49+1=50. Thus $7\times 7 + 1 = 50$

Leviticus 27	Demographic-based valuation: Ratio, fractions and percentages (60%; 50%; 66.6̇%; 20%). g: s =20:1 h: s =1:50, g:h=? ; $\frac{1}{10}+\frac{1}{10}\left(\frac{1}{5}\right)=\frac{1}{10}+\frac{1}{50}=\frac{3}{25}$.
Numbers 1-4; 11:21; 15: 4-10 [28; 29]; 16: 31:5.	Estimation of number of Israelites; Unit and non-unit fractions [FOWL-RB fractions] and ordering: $\frac{1}{10},\frac{2}{10},\frac{3}{10}$ and $\frac{1}{4},\frac{1}{3},\frac{1}{2}$; 50+250+14700=15000; 1000 × 12= 12000
Daniel 8:14; 9:20-27	Integer operation on real number line with applications in date calculations.
Acts 19: 19	Present value of magical books burnt-Fifty thousand pieces of silver.

Source: Field Data, 2023

Table 7: Algebra

Bible Texts	**Ideas/Principles/ Strategies/Concepts**
Exodus 30:23-24	Expression "half as much…" as one-half of reference quantity [$\frac{1}{2}x$=y] and an operator
Leviticus 26:8-9; 14-28	Chaos analysis (puzzle) and algebraic exponential sequence; 'multiply' imply exponential increase (vs9) ; Sinning to obstinacy [$7^{(n-1)} \rightarrow 7^n$]
Isaiah 46:5, 9	**M**athematical 'trilogy' $=, <$ and $>$ inferred. Idolaters presume: Idols $>$ God or Idols=God and summarized as Idol $\geq$God. God declares: God>Idols [Exodus 18:11]
Matthew 26:69-75	Patterns: DDDC…; ADADADC…; DCDDC…
Mark 10:8-12	1+1=2, "joined" to form a new 'product' (×), "flesh" thus, 1 × 1=1
Romans 3:23	$GG - HG = x$ (Effect of sin)

Source: Field Data, 2023

Table 8: Geometry and Measurement

Bible Texts	**Ideas/Principles/ Strategies/Concepts**
Exodus 30:1-2	Altar of incense (cubits) in modern units
Ezekiel 45:10-14	Measures: Basic-ephah/bath: homer = 1:10; garah: shekel: maneh (mina) =1: 20: 1200 and bath: homer: cor (Kor) =1:10:100
Isaiah 40:12, 22; 44:13; 43:5, 6	Terms-measure, weigh, span, scales, circle, compass and compass points-North, South East and West. Israel as point of intersection or reference
2 Corinthians 3:18 [1 Corinthians 15:35-58]	Reflection of object in/as image. Holy Spirit, mirror/ line of reflection, facilitating change from real (bodily) to virtual (Image of God-spirit beings).
Ephesians 3:18	"Comprehend", spatial sense and reasoning, the height (high), width (wide), length (long) and depth (deep) of love, an

	abstract geometric entity in space (physically, New Jerusalem). Embraces collinearity, perpendicularity, parallelism and co-planarity.
Revelation 4:1- 6; 5:6, 11-14.	Problem solving- geometrical drawing and geometric transformation

Source: Field Data, 2023

Table 9: Data and Chance

Bible Texts	**Ideas/Principles/ Strategies/Concepts**
Genesis 35:23-26	Conditional probability: Picking two- a child each of Leah and Rachel = $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$; Leah or Rachel $\frac{1}{2} + \frac{1}{6} = \frac{2}{3}$
Numbers 31:25-54	Sharing of booty- Calculation and representing (graphing-Pie-chart).
I Samuel 6:9	The concept of chance (uncertainty)
Ezra 1	Data, statistics, graphing
Nehemiah 7	Data, statistics, graphing
Isaiah 60:17	Nominal and ordinal data [Gold=1 (1st); Silver=2 (2nd); bronze=3(3rd) and stone =4(4th)]. [Iron, tin & lead added (Numbers 31:22)]
Mark 3:20-30	Statistical error: Type II Error
Matthew 27:35	Casting lots: chance and outcomes. With a coin, 2 outcomes (Head or Tail)

Source: Field Data, 2023

Table 10: Mathematical Physics and Engineering/Puzzle

Bible References	**Ideas/Principles/ Strategies/Concepts**
Ezekiel 48	City and land planning-locating and measurements
Revelation 22:1,2[Ezekiel 47:12];18-19	The puzzle of the tree of life in the middle of a street yet on either sides of the river. “add” (+) and “take away”(−).

Source: Field Data, 2023

The diversity of content areas revealed in Tables 6 to 9 match 21st century K-12 Mathematics Curriculum in Ghana (MOE, 2019). There are elements beyond this levels (i.e. Sundial-related mathematical physics; nth terms and sum to infinity of arithmetic and geometric sequences; statistical error, types of quantitative data).

Mathematics in the Bible has characteristics- *P*rinciples, *E*lements, *O*perations, *P*roblems ***and*** *P*rocess Skills, *L*ogic, logical coherence and fact-validation; *E*quipment (devices) and *D*iversity of content areas. These form an acrostic: ‘PEO*P*LED’. Problem solving requires people (humans) to deploy mathematical process skills, thus, **P**rocesses used by **P**eople to solve mathematical **P**roblems (P-P-P). Mathematicians play this role, thus, are the People in the mist of the PEO***P***LED who use mathematical processes to solve problems. The italicized P in the mist indicates the centrality (mean and median) of the human factor in mathematical exploration and applications.

When P-P-P is used, it expands to PEOP-P-PLED, the human-related factor retains its central status.

Discussion

Literally, the findings reveal formulations that address contemporaneousness of the Biblical patriarchs and Human Existence (HE) on Earth. Thus, based on biblical records, Human Existence (H.E.) on Earth is one-digit multiples of a thousand years and not 315,000 years or theoretical millions of years (see Howard, 2023). The patriarch's ages have been explored, tabulated and formulated (see Christensen, n.d.; Price, 2012; Shalman, 2009) but these did not derive these generalized formulas and Reuben's age relative to Joseph's. The use of scientific phenomena to demonstrate God's power to heal and deliver a dying King gives mathematical credence to the Bible's existential dimension. The derived formulas (HE, FPD; nth and sum to nth terms of AP and GP series) and explicated mathematical ideas indicate, at least, that mathematics in the Bible is not unsophisticated. In 'Elements of mathematics', Stillwell (2016) cites elements in mathematics as arithmetic, computation, algebra, geometry, calculus, combinatorics, probability, and logic. Thus, the use of 'elements' to designate specific mathematical ideas or concepts is thus justified.

That the acrostic "PEOPLED" characterizes mathematics in the Bible is insightful and intriguing. Could it be a prompt that mathematics derived from **'peopled'** groups and meant for the '***people***' (masses) but not a privileged few? The highlight of the centrality of the human factor in problem solving through application of processes is also intriguing. The emergence of process skills such as estimating, calculating, conjecturing and visualizing in this study confirms problem solving as key characteristic of Bible mathematics. Ghana's K-12 curriculum (MOE, 2019) cites observing, communicating, designing, measuring, interpreting and deriving conclusions etcetera as process skills leaners must acquire through contextualized situations and these have reflected in this study.

That mathematics in the Bible matches the contents for instruction in 21st century K-12 Ghanaian Basic School Curriculum (MOE, 2019) with some elements applicable at the tertiary level attests to the pervasiveness of mathematics, its embeddedness in context and its modern-era mathematical relevance. The Bible provides contextualized mathematics deemed ideal for developing proficiency and capacity for transfer to real-life situations (Tout, 2014; Van den Heuvel-Panhuizen, 2000). As already revealed in literature (Adejumo, 2018; Baker, 2016; Christensen, n.d.; Matiki, 2014) and confirmed in this study, exquisite mathematics implicitly and explicitly embed the Bible texts and contexts.

Stillwell (2016) has explicated how arithmetic, computation, algebra, geometry, calculus, combinatorics, probability, and logic interplay into more advanced mathematical topics required for building up mathematics as a whole. Bishop (1988) also alludes to counting, locating (in space), measuring, designing, playing and explaining as six universal practices that generate mathematics in all cultures. The diverse mathematical contents and elements indicate that the Bible has nearly all that is required for building up mathematics. Had the Bible been embraced and studied as an authoritative document, it would have activated the discovery of todays' level of mathematics disciplinary knowledge. Representing or symbolizing of these ideas, the first step in mathematizing, could have triggered it.

This study presents a mathematical context and perspective to the Bible that deepens the religious and spiritual insights gleaned from the texts and points to the fact that mathematics is intricately interwoven with spiritual and religious phenomena. The appreciation of the mathematical elements in the texts of the Bible points to the pervasiveness of mathematics and supports the argument that every aspect of life has mathematical interpretation. The Bible thus has academic or educational value that can be harnessed to enrich curriculum and instruction.

Conclusion

Rich and cognitively challenging formulable or explicable mathematics elements, ideas and concepts, are in the texts and underlie contexts of the Bible. It includes mathematics related to existential issues and scientific phenomena. Specifically, there are among others, formulable statistical data for estimating existence on earth and age of a patriarch relative to another; formulable twin geometric and arithmetic sequences and estimates for minimum number of created angels and the size of New Jerusalem. John 3:16, interpreted mathematically, is a logical statement, and mathematics in the Bible, based on the selected texts, is characterized by principles, elements, operations, problems and process skills, logic, logical coherence and fact validation, equipment (devices) and diversity of content areas. These form an acrostic: PEO*P*LED. The Bible thus has mathematical worth. It looks plausible more mathematics are in the Bible awaiting unravelling.

Recommendations

The following are recommended:

1. First, mathematics is better studied in and from contexts. Faith-based schools can incorporate the unraveled mathematics in biblical context into their curriculum and the teachers can use it to self-train on mathematizing from context.
2. A study by mathematics teacher educators and researchers that translates the mathematical contents and ideas captured in this study into mathematical problems in real classroom is needed to validate the practicality.
3. A study can be commissioned by universities and Christian missions to unravel mathematics inherent in the entire book of the Bible to better appreciate its mathematical worth and explore ways of incorporating it into the existing curriculum to enrich it for faith-based education.
4. The mathematical processes involved in mathematizing mathematics in the Bible require unravelling. This would enhance the mathematical value of the Bible.
5. The Bible is the religious text used in this study; it can be replicated with other religious texts and compared.

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Assessment of Job Satisfaction among Early Childhood Education Teachers in Edo State, Nigeria

Nkechi Obiweluozor (PhD)[1*] & Iduozee Matthew[2]

[1]Department of Educational Management, Faculty of Education, University of Benin, Benin City; Email: nkobiweluozor@yahoo.com/ nkechi.obiweluozor@uniben.edu Tel No.: 2347015204355*

[2]Department of Educational Management, University of Benin, Benin City, Principal Consultant, Pisammat Global Resources Ltd., Nigeria; Email: peacemaker4mgt81@gmail.com; Tel No.: 2348038349234

ABSTRACT

The study examined job satisfaction among early childhood education teachers in Edo State. Four research questions were raised for the study, and three were formulated into hypotheses. The study adopted a descriptive survey design. The study's population comprises all the one thousand and twenty-one (1021) public early childhood education schools and one thousand two hundred and sixty-three (1263) early childhood education teachers in Edo State. A multi-stage sampling technique was used to select a sample of one hundred and two early childhood schools and one hundred and twenty-six early childhood teachers in the three senatorial districts of Edo State. A questionnaire (JSAECETQ) validated with a reliability coefficient of 0.97 was used to collect data from the respondents. The research questions were analysed using mean and standard deviation while hypotheses were tested using Pearson Product Moment Correlation Coefficient at 0.05 level of significance. The findings revealed that the level of job satisfaction among early childhood education teachers in Edo State is low and that there is a positive and significant relationship between working conditions, professional growth and advancement opportunities and job satisfaction among early childhood teachers in Edo State. The finding also revealed that there is no significant relationship between the involvement of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State. Based on the findings, the study recommended that the working conditions of early childhood teachers should be improved upon by the relevant stakeholders by making adequate provision for their "welfare needs such as car loans, accommodation facilities, study leave with pay, leave of absence when needed, provision of instructional materials to improve their job performance, protection from occupational hazards and regular promotion as at when due

Keywords: Job satisfaction, early childhood education, teachers, working conditions, professional growth and advancement, teachers' involvement

INTRODUCTION

Education is recognized worldwide as a tool for achieving socio-economic growth and national development. It is in recognition of this vital role that Mgbodile (2004) observed that it is through

well-planned and implemented educational systems that advanced nations of the world have attained a high level of social, economic, scientific, and technological advancement. This viewpoint is equally in agreement with the views of Sergiovani and Starrat (1996), Okeke (2008), and Chukwu (2011) that any nation that wants to be developed must have a worthwhile system of education for its citizens. In Nigeria, the educational system is organized into different education levels: early childhood education, primary education, secondary education, and higher education. However, it is worth noting that in this study, we are interested in early childhood childhood education teachers' job satisfaction.

Early childhood education has been conceptualized in different ways. According to Bright (2006), early childhood education refers to the formal teaching of young children by people outside the family or in settings outside the home. Ogbonnaya (2003) briefly defined early childhood education as the education received by children before the age of primary education; while the Federal Republic of Nigeria (2004) conceptualized it as the education given in an educational institution to children prior to entering the primary school. Early childhood education is the foundational education given to children aged 3 to *5* years plus in creche, nursery and kindergarten to properly form their minds for primary education. Therefore, early childhood education is the gateway to sound primary education.

The objectives of early childhood education in Nigeria include effecting a smooth transition from the home to the school; preparing the child for the primary level of education; providing adequate care and supervision for the children while their parents are at work; inculcating social norms; inculcating in the child the spirit of enquiry and creativity through the exploration of nature, the environment, art, music and playing with toys, artistic and musical activities; developing a sense of co-operation and team-spirit; learning good habits, especially good health habits; and teaching the rudiments of numbers, letters, colours, shapes and forms through play (NPE, 2014).

It is pertinent to note that the achievement of the above laudable objectives of early childhood education requires that the early childhood education teachers who are responsible for delivering education to young children have to be satisfied with their jobs to be motivated to perform maximally towards realising the identified goals of early childhood education. Therefore, job satisfaction among early childhood education teachers is pivotal to achieving the objectives of early childhood education. Job satisfaction has been defined in diverse ways. According to Breed and Breda (1997), job satisfaction is when the employee of an organization evaluates the current conditions of their job and sees these conditions as meeting their expectations. Christopher (2005) defined job satisfaction as a positive employee's emotional state arising from the performance of job in a manner that is motivated to perform appointed duties effectively and efficiently; while Emenike (2007) and Chukwukere (2009) in their perspective succinctly defined job satisfaction as a feeling of joy, contentment and achievement arising from the performance of one's job. One can, however, conclude from the above definitions of job satisfaction that job satisfaction is a feeling of happiness and fulfilment, about the work that one does in an organization; the above definitions of job satisfaction also indicate that job satisfaction implies doing ones job with enthusiasm and

happiness; job satisfaction is also the key ingredient that leads to recognition, income, promotion and the achievement of other goals that lead to a feeling of fulfilment (Kaliski, 2007).

Nwankwo (1982) asserted that teacher's job satisfaction can be achieved through; enhancing the feelings of teachers achievement by recognition and rewarding excellence; involving teachers in decision-making and leadership; proving healthy social climate in the school and improving teachers personal outlook; making the work challenging and enjoyable to teachers by way of assigning special duties and protect them; assigning responsibilities for special function to teachers and ensure adequate authority for carrying them and promoting teachers' personal and professional advancement through recognition of the role played by the teacher. Ayeniyo (2015) opined that fringe benefits are forms of supplementary compensation that can provide mutual advantages to both the employers and employees in terms of increased productivity, job satisfaction and improved standard of living. Korlo and Akintunde (2016) stated that job satisfaction is a function of the extent to which a staff aspirations, desires and needs are met or satisfied on the job.

Evans (1998) contends, "Teachers are feeling disillusioned, demoralized, and angry at being forced to carry out unpopular government policies, while being constantly blamed for society's ills. They are fed up with having to teach children in ever larger classes, working in schools which are dilapidated, underfunded, and overstretched". The way individual teachers view themselves as contributors to the whole school, appear to be important to their level of satisfaction beyond the classroom, and the formation of this view of teachers is related to their school culture environment (Lortie, 1975)

The importance of job satisfaction among staff of any organization has been highlighted. According to Lawler (2001) and George and Jones (2008), staff job satisfaction brings about the effectiveness and efficiency of organizations because when workers are satisfied with their jobs, they are happy and make maximum contributions to the realization of organizational goals. In the same vein, Blanchard (1998) and Emenogu (2003) remarked that the job satisfaction of staff is important to every organization in the sense that workers who are satisfied with their jobs will be much more productive and they will be retained in the organization for a longer period in comparison to dissatisfied workers who will be less useful to the organization and have a greater tendency to quit the job.

The views above show that, job satisfaction is an important factor in an organization's success since it brings about increased productivity on the part of the employees. This means that when early childhood education teachers are not satisfied with their jobs, it will result in dissatisfaction, frustration, negligence, and consideration to quit the job (Egbokhare, 2010). These will in turn hamper the realization of the goals of their institutions of learning, hence, the need for job satisfaction among early childhood education teachers.

According to Nwafor (2011), working conditions are the conditions under which the job must be done and the extent to which the conditions make the job disagreeable or pleasant. Therefore, making available good working conditions to early childhood education teachers entails adequate and prompt payment of their salaries and allowances; supplying them with all the necessary facilities, equipment and materials that make for effective teaching and learning; giving them

regular promotion; ·and making adequate provision for their welfare and security needs (Unugbro, 1995; Igwe, 2003). In assessments of working and employment conditions, including issues of occupational safety and health, maternity protection, work-family issues, homework, working time, wages and income, work organization, workload, worker's welfare facilities, housing, nutrition and environment, teachers face perhaps the greatest problems among the working population (Nwankwo (1982). A conducive work environment ensures the wellbeing of employees, which always enabled them to exert themselves to their roles with all force that may translate to higher productivity (Akinyele, 2007).

Professional growth and advancement opportunities is other factors that could be responsible for job satisfaction among early childhood education teachers. These, essentially, are in the form of staff training and development programmes organized for early childhood education teachers to enable them to perform their duties effectively and be prepared for higher responsibilities in their schools. Thus, for early childhood education teachers to be satisfied with their jobs, they have to be provided with opportunities for their professional growth and advancement which Peretomode (2003) and Oboegulelem (2004) see as encompassing in-service educational programmes, periodic seminars, sandwich programmes, regular supervision for improving their knowledge and skill, and providing them with modern library with adequate facilities and equipment. In support of the above viewpoint, Nwuzor and Ogbonna (1995) and Obinwa (2007) remarked that training and development of the staff of educational institutions aim at providing them with opportunities for the development of leadership through the exercise of responsibility, development of problem-solving and decision-making skills, participation in decision-making on significant issues which affect them, experiment and initiate change, exchange ideas and information, give clear understanding of roles and responsibilities, and accept new challenges and experiences

Involvement of early childhood teachers in the administration of schools could also influence them to be satisfied with their jobs. Okeke (2007) sees this as an opportunity to give them a sense of belonging, recognition and job satisfaction needed for effective and successful school administration. Early childhood education teachers can be involved in the administration of their school by encouraging their participation in the running of their school, accepting their suggestions and constructive criticisms in matters concerning their school, engaging them in frequent discussions on their school's problems and achievements, the school administrators making themselves accessible, and delegating administrative responsibilities (Ulco and Ekeruo, 1992; Nwankpa, 2007).

However, it has been insinuated that early childhood education teachers in Nigeria (Edo State inclusive) are not satisfied with their jobs. To bolster this assertion, Igbuzor (2009) opined that early childhood education teachers in Nigeria are not satisfied with their jobs because they lack good working conditions as they are faced with the problems of inadequate salaries and allowances, inadequate promotion and opportunities for their professional growth and advancement. The above viewpoint indicates a lack of job satisfaction among early childhood teachers in Nigeria.The findings of this study would be of benefit to the government by providing

a useful guide to the government on the various strategies that could be employed to improve, achieve and sustain the job satisfaction of early childhood teachers in Edo state.

Statement of the Problem

Job satisfaction among early childhood education teachers in Nigeria including Edo State has been a source of concern, this concern arises from the fact that the level of job satisfaction among early childhood teachers seems not to be high and this has affected their level of job performance and commitment. In recent times, early the salaries and allowances for early childhood teachers are not adequate, especially in this present economic situation in Nigeria where the cost of living is relatively high compared to the take-home pay. This has resulted in their dissatisfaction as evidenced in their negative attitude towards their work which has shown in truancy or being late to work, ineffective use of working hours; poor performance; teaching late; completing assignments late; often leaving the office before office hours are over and trading during school days within the school compound. These negative attitudes of early childhood teachers show that they are not satisfied with their job. This dissatisfaction negatively impacts the quality of education and does not fulfil students' rights to study optimally.

It is perceived that early childhood education teachers in Edo State lack good working conditions in the area of poor salary, inadequate instructional material, lack of professional growth and advancement opportunities. Consequently, this study seeks to assess job satisfaction among early childhood teachers in Edo State to ascertain the veracity of the situation

Research Questions

The following research questions guided this study:

i. What is the level of job satisfaction among early childhood education teachers in Edo State?
ii. Does working conditions influences job satisfaction among early childhood education teachers in Edo State?
iii. Do professional growth and advancement opportunities influence job satisfaction among early childhood education teachers in Edo State?
iv. Does the involvement of early childhood teachers in school administration influences job satisfaction among early childhood education teachers in Edo State?

METHODOLOGY

This study focused on the indices of job satisfaction among early childhood education teachers namely: good working conditions, professional growth and advancement opportunities and involvement of early childhood education teachers in the administration of their school. This study is delimited to all the public early childhood education institutions in Edo State, Nigeria. The study adopted a descriptive survey design. This study's population comprised all the one thousand two hundred and sixty-three (1263) early childhood education teachers in Edo State. The sample

consisted of 126 respondents representing 10% of the total number of early childhood education teachers in Edo State using multi-stage sampling procedure. Stage 1: the State was stratified into three (3) Senatorial Districts using the StratifiedSampling Technique. Stage 2: from each of the Senatorial Districts, approximately ten percent (10%) of early childhood schools were randomly selected using the simple random sampling technique which were thirty (30) public early childhood education schools from Edo North Senatorial District, forty-nine (49) public early childhood education schools from Edo South senatorial District and twenty-three (23) public early childhood education schools from Edo Central Senatorial District. Stage 3: From each of the sampled schools in each Senatorial District, ten percent (10%) of early childhood teachers were selected using the simple random sampling technique which is thirty eight (38) teachers in Edo North Senatorial District, sixty-six (66) teachers from Edo South Senatorial District and twenty-three (23) teachers from Edo Central senatorial District. Thus, one hundred and twenty-six (126) teachers were selected from the sampled public early childhood education schools in Edo State. A questionnaire which was titled "Job Satisfaction among Early Childhood Education Teachers Questionnaire (JSAECETQ)" was used to collect relevant data for the study. The validity of the there is something missing here was ascertained through three (3) academic staff of the department of Educational Management, University of Benin, their choice was based on their expertise and experience in developing research instruments. To ascertain the instrument's reliability, “it was trial-tested on 20 staff of selected early childhood education institutions in neighbouring Delta State. Cronbach's Alpha method of reliability estimate was used to determine the instrument's internal consistency and the overall reliability coefficient was 0.975”. This value was considered high enough to make the instrument reliable in obtaining the needed information for the study. The questionnaires were administered to the respondents by the researchers in their various schools. The data collected were analysed using mean and standard deviation for research questions while the hypotheses were tested using Pearson product moment correlation. The hypotheses were all tested at 0.05 level of significance. A mean value of 2.50 which is the arithmetic mean of the 4-points Likert scale was used for the acceptance for the research question

FINDINGS

Level of Job Satisfaction among Early Childhood Education Teachers

Research Question 1: What is the level of job satisfaction among early childhood education teachers in Edo State?

To answer this question, the data collected on job satisfaction among early childhood education teachers in Edo State were analysed using mean and standard deviation as shown in *Table 1*.

Table 1: Mean and standard deviation scores on the level of job satisfaction among early childhood education teachers in Edo State

Item	N	Mean	SD	Remarks
“I feel I am being paid a fair amount for the work I do”.	126	2.46	0.95	Low
“I don't feel my efforts are rewarded the way they should be”.	126	2.07	0.34	Low
“I would consider leaving my job for another with greater opportunities for advancement”.	126	2.71	0.75	Moderate

"I receive the information, tools and resources I need to do my job"	126	2.57	0.73	Moderate
My physical working environment is conductive for my job.	126	2.34	0.77	Low
There is availability of schemes for personal growth and development for early childhood teachers.	126	2.06	0.65	Low
Grand Mean		2.37	0.70	Low

Mean score less than 2.50 is low, 250 to 2.99 is moderate, while 3,00 and above is high, SD: standard deviation

Data in Table 1 shows the computed mean which ranges from 2.06 – 2.71 and SD which ranges from 0.34 – 0.95 respectively. The computed grand mean of all the items is (2.37) falling below 2.50 on the scale. This implies that the level of job satisfaction among early childhood education teachers in Edo State is low.

Hypothesis One

There is no significant relationship between working conditions and job satisfaction among early childhood education teachers in Edo State.

Table 2: Pearson's Correlation of working conditions and Job Satisfaction among early childhood teachers in Edo State.

Variables	Job Satisfaction		
	N	Pearson's correlation	Sig/2-Tailed
Working conditions	126	0.947	0.000

P-value significant at 0.05 level (2-tailed), (Reject Hypothesis)

Table 2 shows a Pearson's r of 0.947 and a p value of 0.000 testing at an alpha level of 0.05. The p value is less than the alpha level so the null hypothesis that "there is no significant relationship between working conditions and job satisfaction among early childhood education teachers in Edo State" is rejected. Consequently, there is a positive and significant relationship between working conditions and job satisfaction among early childhood teachers in Edo State.

Hypothesis Two

There is no significant relationship between professional growth and advancement opportunities and job satisfaction among early childhood education teachers in Edo State

Table 3: Pearson's Correlation of professional growth and advancement opportunities and job satisfaction among early childhood education teachers in Edo State

Variables	Job Satisfaction		
	N	Pearson's correlation	Sig/2-Tailed
Professional growth and advancement	126	0.802	0.000

P-value significant at 0.05 level (2-tailed), (Reject Hypothesis)

Table 3 shows a Pearson's r of 0.802 and a p value of 0.000 testing at an alpha level of 0.05. The p-value is less than the alpha level so the null hypothesis which states that "there is no significant relationship between professional growth and advancement opportunities and job satisfaction among early childhood education teachers in Edo State" is rejected. Consequently, there is a positive and significant relationship between professional growth and advancement opportunities and job satisfaction among early childhood education teachers in Edo State

Hypothesis Three

There is no significant relationship between involvements of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State.

Table 4: Pearson's Correlation of involvements of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State

Variables	Job Satisfaction		
	N	Pearson's correlation	Sig/2-Tailed
Involvements in school administration	126	0.155	0.084
P-value significant at 0.05 level (2-tailed), (Reject Hypothesis)			

Table 4 shows a Pearson's r of 0.155 and a p value of 0.084 testing at an alpha level of 0.05. The p value is greater than the alpha level so the null hypothesis which states that "there is no significant relationship between involvements of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State" is accepted. Thus, there is no significant relationship between the involvements of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State

DISCUSSION OF FINDINGS

The findings from research question one revealed that the level of job satisfaction among early childhood teachers in Edo State is low. This is because early childhood teachers in Edo State are not rewarded with salaries commensurate with what they put in their jobs. Also, their low level of job satisfaction may be as a result of their physical working environment is not conducive for them to do their job, the low level of job satisfaction could also be as a result of inadequate attention of Edo state government towards the provisions of welfare needs such as "car loans, recreational and accommodation facilities, study leave with pay, and leave of absence when needed", hence, early childhood teachers in Edo state are not satisfied with their working conditions. This study is in agreement with Modest and Onyango (2021) who revealed that poor salaries and lack of a conducive environment of work were responsible for low levels of job satisfaction among teachers in public secondary schools in Bukoba Rural District Bukola in Kagera Region, Tanzania. The Authors further identified poor teacher-supervisor relationships, inadequate teacher housing, and concerns about teachers' health and safety as factors influencing job satisfaction. This study was also in agreement with the findings of Ada (2021) who revealed that indices of good working

conditions such as "prompt payment of salaries and allowances, adequate provision of physical facilities and equipment, provision of instructional materials, regular promotion, provision of security needs and adequate provision of welfare" where indices of good working conditions that can enhance the job satisfaction of primary schools' teachers in Tanzania.

The findings of hypothesis one revealed a significant relationship between working conditions and job satisfaction among early childhood education teachers in Edo State. This finding was supported by Jentsch, Hoferichter, Blömeke, König, and Kaiser (2023) who researched the relationship between working environment and teachers' job satisfaction, perceived work-related stress, as well as work-related self-efficacy and found out that there is a significant relationship between working conditions and job satisfaction. The finding of this study was also in agreement with the study by Sadikin, Andriana, Manap, Ramli and Hendrajaya (2023) on the relationship between job satisfaction and working environment of teachers in Islamic Private Schools in South Tangerang City, Indonesia. The results of the study revealed that there is a significant relationship between working conditions and job satisfaction. This study was further corroborated by Admiraal (2023) who averred that working conditions significantly influence the teachers' job satisfaction. The findings of this study also draw support from Ertürk (2022) who posited that there is a strong positive relationship between all dimensions of good working conditions of teachers and job satisfaction. However, this study is at variance with Veletic, Price and Olsen (2023) who revealed no significant relationship between working conditions and job satisfaction among secondary school principals and teachers in the thirty-seven countries that participated in their study.

The findings of hypothesis two revealed a significant relationship between professional growth and advancement opportunities and job satisfaction among early childhood education teachers in Edo State. The finding agreed with the findings of Mwiti, Moguche and Rintari (2021) who revealed that "there is a significant relationship between career advancement and job satisfaction of secondary school teachers in Igembe North sub-county". However, the finding of this study is at variance with Brown (2018) who discovered that no statistically significant relationship exists between the perception of principals and teachers on the level of professional growth and advancement and job satisfaction in a professional learning community regardless of their gender identity or educational role in California secondary schools.

The findings of hypothesis three revealed that "there is no significant relationship between involvements of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State". This finding corroborates with that of Hirsch, Emerick, Church and Fuller (2007) who posited that "there was no significant relationship between the perception of principals and teachers on the level of involvement and job satisfaction in community schools in North California". However, the finding of this study is at variance with Ayegbusi and Ogunlade (2020) who conducted a study to investigate the relationship between teachers' decisional participation and job satisfaction in secondary schools in Ekiti State, the study revealed that "there was a significant relationship between teachers' decisional participation and their job satisfaction". This study also disagrees with the findings of Okeke (2022) who carried out a study to investigate the influence of distributed leadership on teachers' job satisfaction in the

Awka Educational Zone of Anambra State. Findings from the study revealed that teachers' participation in decision making, teachers' belonging to the leadership teams and teachers' collaboration influence their job satisfaction.

Implication of the Findings for Educational Management

This study's findings will guide education policymakers, educational managers, ministries, and agencies of education on the importance of job satisfaction among early childhood teachers and the strategies to adopt to enhance job satisfaction among teachers in educational institutions.

CONCLUSION

It was observed that the level of job satisfaction among early childhood education teachers in Edo State is low, that there is a positive and significant relationship between working conditions and job satisfaction, there is also a positive and significant relationship between professional growth and advancement opportunities and job satisfaction among early childhood education teachers in Edo State. However, there is no significant relationship between the involvement of early childhood teachers in school administration and job satisfaction among early childhood education teachers in Edo State.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The relevant stakeholders should improve upon the working conditions of early childhood teachers by making adequate provision for their "welfare needs such as car loans, recreational and accommodation facilities, study leave with pay, and leave of absence when needed, provision of instructional materials to improve their job performance, provision of health insurance, protection from occupational hazards as well as regular promotion of early childhood teachers as at when due".
2. Early childhood teachers should have more opportunities for professional growth and advancement through in-service training and scholarships to upgrade their knowledge and certificates.

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Genetic Testing: Knowledge, Attitude and Genetic Risk Information of Women, Implications for Counselling among Girls in Oyo State, Nigeria

Bolanle, Oyundoyin[1], Oluwaseyi, Sonola[2], Temiloluwa, Oyundoyin[3], Oluchi, Onasanya[4] and Wasiu, Afolabi[5]

[1, 2]Department of Home Science and Management, Federal University of Agriculture, Abeokuta, P.M.B. 2240, Abeokuta, Nigeria

[3]Department of Bioethics and Medical Humanities, University of Ibadan, P.M.B. 5017 G.P.O. Ibadan, Nigeria

[4]Department of Early Childhood and Educational Foundations, University of Ibadan, P.M.B. 5017 G.P.O. Ibadan, Nigeria

[5]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, P.M.B. 2240, Abeokuta, Nigeria

*Correspondence: Bolanle, Oyundoyin, Department of Home Science and Management, Federal University of Agriculture, Abeokuta, P.M.B. 2240, Abeokuta, Ogun State, Nigeria (E-mail: oyundoyinbm@funaab.edu.ng).

Abstract

Genetic diseases or congenital abnormalities resulting in developmental disorders among children that has led to untold hardship in families could have been averted if women had gone through genetic testing before marriage or conception. This study examined the Knowledge, Attitude and Genetic Risk Information (GRI) of Women on Genetic Testing in Oyo State, Nigeria. The study adopted a descriptive survey design. Questionnaire was used to elicit information from 200 respondents. Three null hypotheses were raised and data collected were analysed using frequency counts, percentages, means, standard deviation, Chi-square, Pearson Product Moment Correlation (PPMC).Chi-square results socio-demographic characteristics (age, educational qualification, employment status, marital status, number of children, tribe and religion) and knowledge on Genetic Testing of respondents on genetic testing showed that educational qualification (X^2= 41.64, p=0.00) and tribe (X^2=12.60, p=0.00) influenced their knowledge. Secondly, religion X^2 = 7.97, p=0.02 was significant in influencing the attitude of the respondents towards genetic testing when compared with socio-demographic characteristics. However, genetic risk information and attitude towards genetic testing was significant using PPMC as (r= 0.17, p = 0.02). In conclusion, educational qualification and tribe influenced the knowledge of the respondents on genetic testing. Religion and the availability of genetic risk information positively affected individuals' attitude towards genetic testing. It was recommended that education on genetic testing and genetic risk information should be organised so as to educate women about genetic testing, thereby influencing their attitude positively towards their participation in genetic testing.

Keywords: Knowledge, Attitude, GRI, Women, Genetic Testing

1.

The condition caused by abnormalities in an individual's DNA is called genetic disease. It can be inherited from either or both parents and it can also happen due to spontaneous genetic mutation. While genetic testing is a process of analysing someone's Deoxyribonucleic Acid (DNA) in order to determine if there is a mutation that can cause disease, however, scientific advances play important roles in the field of medicine nowadays. For example, pre-natal genetic testing has been successfully utilised as a tool in ameliorating chromosomal abnormalities in countries where it is available and accessible for the inhabitants whether citizens or foreigners living in those countries. There have been commercially available pre-natal genetic screening tests due to the availability of clinical genetics give room for the circulation of cell-free fetal DNA in a maternal blood sample to identify fetal risk for specific congenital defect or defects as the case may be. (Webber, 2023).

Globally, prevalence of genetic disorders and congenital abnormalities is assumed to be 2%-5% of all live births because it is rare. For example, sickle cell disease is one of the most common genetic disorders in Nigeria with carriers of the mutant gene accounting for about 24% of the population and about 150,000 children born yearly are affected with this disease in Nigeria alone. Some other genetic diseases found in Nigeria are: Down syndrome and Turner's syndrome. According to the finding of Hanan et al, (2015), Down syndrome in Nigeria has an incidence of 1 in 865 live births with a high incidence of cases among young mothers. The scanty record of prevalence of genetic diseases especially in Nigeria, is largely attributed to substandard healthcare facilities available at health centres leading to the mortality of some children born with genetic diseases or congenital abnormalities. Which could have been averted if the parents had done genetic testing before marriage (Hanan, Saher & Fatma, 2015).

Moreover, congenital diseases or congenital abnormalities can be prevented, or reduced to the barest minimum by providing accessible and adequate pre-natal and post-natal genetic testing routines to the populace at no-cost or subsidised rate and performing non-invasive pre-natal testing (NIPT) especially between 9th and 10th week of pregnancy. The high-risk group is consanguineous marriages that can lead to a recessive syndrome due to marriage from the same ancestor but could be subjected to proper and adequate genetic counselling in order to have a safe and sound baby. The increasing availability of predictive genetic testing for late-onset diseases means that there is a growing need to understand the psychological consequences of such testing. According to Lin, Hasbullah, Sivam, Shanmugam, Augustine, Htay, Moe and Soe, 2022, when newly diagnosed patients with genetic disease or rare hereditary disorders are discovered, genetic testing can assist in early detection and receive disease-specific treatment as soon as they show up.

Genetic testing also known as DNA testing is a kind of test that has the capacity to identify defects in genes, chromosomes or proteins in an individual's body. This is done through the sample from the blood, hair, skin, tissue or amniotic fluid. The test can detect or confirm if there is any genetic disorder and can equally determine if there is any chance of developing or transferring a genetic disease (ACOG, 2022; AMA, 2022).

Although, the psychological consequence of genetic testing for adults is determined but that of children who are the most vulnerable to emotional and psychological trauma are not fully

established regarding the emotional distress and the effect on their self-esteem (Broadstock, Michie, Marteau, 2000). Various methods are available for smart and reliable testing of the DNA in humans. People at risk are duly referred to a qualified physician, who specialises in investigating, diagnosing and treating individuals who are suspected of having, or who do actually have, genetic disorders. In the process of examination, the background to the disorder is carefully considered, as well as any personal and family precedents and symptoms are fully ascertained. If a specific genetic disorder is suspected, a genetic test is proposed instantly and the diagnosis is carried out to establish the truth about its existence (Phadke & Gowda, 2013).

Some genetic tests check if there are deletions or insertions in the genetic materials. There are several methods to detect such changes but (Multiplex Ligation Dependent Probe Amplification (MLPA) analysis or Polymerase Chain Reaction (PCR) analysis are the most commonly used. Also, DNA changes can be visibly enormous: a missing or added piece of a chromosome, an entire chromosome, or swapping of chromosome fragments (called translocation) will have to be analysed by microscopically coding at the entire chromosome. Considering the studies on chromosomes or genes, genetic testing can also include biochemical tests to identify the presence or absence of Radiometric-microbiological assay (RMA), epigenetic changes (of DNA associated molecules) and biochemical tests, key proteins or their products. The proteins are made by genes; therefore, an abnormal protein implies that the gene has mutated or transfigured (Phadke, *et al.* 2013).

1.1 Statement of the Problem

Genetic diseases or congenital abnormalities are real and are promoting issues in the family due to the stress involved in taking care of children with genetic diseases. Moreso, genetic testing raises concern about privacy and confidentiality of sensitive genetic data. Hence, ensuring informed consent and autonomy in decision making regarding genetic testing is key in order to uphold ethical standards. Ethical consideration also includes the responsible use of genetic information to avoid stigmatization and discrimination based on revealed genetic dispositions. Therefore, promoting equity in access to genetic testing services and ensuring that individuals understand the implications of genetic testing results are essential ethical considerations for example, having witnessed or experienced directly or indirectly, the emotional and psychological consequences on parents of children with congenital abnormalities in the society, in order to ameliorate the future occurrence of these abnormalities and the accrued stress and financial burden on the significant others for instance, parents, siblings, the vulnerable children, government and the society at large this study set to assess the knowledge of women on genetic diseases, pre-natal genetic testing, willingness to do the test, attitudes of women towards genetic testing, use of common tests available as well as willingness to terminate affected pregnancies in case they had married before discovering their genetic statuses, the knowledge of mothers' opinions on newborn screening, their attitudes towards the need for consent and the impact of a diagnosis of a genetic disease or carrier status. Therefore, genetic education is necessary to promote informed decision-making, reduce genetic essentialism and improve genomics literacy. For this cause, this study was on Genetic Testing: Knowledge, Attitude and Genetic Risk Information among Women in Elere, Iddo Local Government Area, Oyo State, Nigeria.

1.2 Purpose and Objectives

The general purpose of the study was to: examine the awareness and attitude of women towards genetic testing in Elere, Iddo Local Government Area, Oyo State, Nigeria

The specific objectives are as follows:

(a.) determine the socio-demographic characteristics of the women in Oyo State regarding genetic testing;
(b.) evaluate the knowledge of women on genetic testing in Oyo State;
(c.) assess the genetic risk information available to respondents
(d.) identify the attitude of women in Oyo State towards genetic testing

1.3 Justification of the Study

Genetic testing is the most reliable way to make an accurate diagnosis of some specific disorders. It has numerous advantages irrespective of the final results positive or negative. A gene mutation test result provides a sense of relief from the fear of uncertainty and prepares people for adequate access to informed decisions about managing their health irrespective of their gender. For example, a negative result can eliminate the need for unnecessary checkups and screening tests in some cases in the future. A positive result guides a person towards available preventive procedures, monitoring and treatment options. Some test results equally allow people to make decisions about having children or not depending on the couple. Newborn screening is used to identify genetic disorders early in life in order to commence treatment as early identification is key in managing the disease or diseases identified. The study will serve as a guide to counselling girls on the importance of genetic testing; acquaint them with the knowledge on genetic testing and redirect them to having a right attitude towards genetic testing.

1.4 Hypothesis of the Study

$H0_1$: There is no Significant Association between the Socio-Demographic Characteristics of the Respondents and their knowledge on genetic testing

$H0_2$: There is no Significant Association between the Socio-Demographic Characteristics of the Respondents and their Attitude towards Genetic Testing

$H0_3$: There is no Significant Relationship between Genetic Risk Information and Attitude of the respondents towards Genetic Testing

Theoretical Framework

This research is hinged on Health Belief Model (HBM) which is the tool that scientists use to predict the behavior of human beings at any point in time. This model was developed in the 1950s and was formally proposed by a group of social psychologists who are Godfrey Hocbaum, Irwin Rosenstock, Rosenstock and Kirscht. The theorists propounded that an individual's willingness to change his or her behavior is related to their health perceptions (Boskey, 2023).

The model assumes that one's belief about health and health conditions largely determines one's health-related behavior. The salient factors that affect one's approach to health are:

a. How susceptible someone thinks he or she is to illness

b. One's thought about the consequences of becoming ill
c. Accessibility of information that prompts one to take action
d. Any barrier one thinks might pose a risk in one's way to success
e. One's confidence in one's ability to succeed in life
f. The thought of the benefits of engaging in healthy behavior (Boskey, 2023).

The Components of Health Belief Model include:

a. Perceived severity: Changing one's health behavior pends on one's feeling on how grave the consequences will be.

b. Perceived susceptibility: Some people will not change their health behavior unless they are at risk.

c. Perceived benefits: People may not agree to change their behavior unless there are benefits to gain from it.

d. Perceived barriers: Some will not change their health behavior because of the difficulty in doing so. E.g. it may involve time, money and deliberate effort to accomplish this.

e. Cues to action: These are external events that initiates a desire to make a change in health behavior.

f. Self-efficacy: This deals with someone's belief in his or her ability to make a health-related change (Boskey, 2023).

Health Belief Model can be used to create programs and interventions designed to assist in the prevention of health challenges, support behaviour change of girls and treat behaviour where necessary. It is also effective in producing behaviour change interventions. According to research, Health Belief Model (HBM) is used for designing strategies to promote healthy behaviour, improve the prevention and treatment of health conditions (Boskey, 2023).

Methodology

Method of Data Analysis

Research Design

In this study descriptive research design was employed for collection of data.

Population

The population of the study consisted of 200 females with age range of 18-60 years in the study area, Oyo State.

Sample and Sampling Technique

Simple random sampling technique was adopted in this research to determine the proportion of respondents from different locality in the study area, Ibadan, Oyo State.

Research Instrument

The questionnaire is made up of three sections, namely, Section A: Socio-demographic characteristics of the respondents {sex, age, religion, marital status etc.}. Section B: Basic information of the respondents. Section C: Genetic risk information available to respondents. Section D: Attitude of the respondents to genetic testing.

Validity and Reliability of Research Instrument

The validity and reliability test in this study was conducted to assess the knowledge, attitude and genetic risk information available to individuals in order to determine their attitude to genetic testing. Face validation was carried out by experts in the researcher's department and the reliability of the instrument was 0.60 based on the test-retest method using Cronbach's alpha. 200 copies of the instrument (questionnaire) were personally administered to the respondents by the researchers in Oyo State. The researchers gave the respondents ample time to fill the questionnaire after which they were collected and analysed using descriptive statistics e.g. means, percentages, frequency and standard deviation and inferential statistics such as Pearson's Product Moment Correlation coefficient (PPMC) and Chi-square was used to test the hypotheses of the study

Method of Data Analysis

Data collected was analysed using both descriptive and inferential statistics. Descriptive statistics such as means, percentages, frequency counts and standard deviation while inferential statistics such as Pearson's Product Moment Correlation coefficient (PPMC) and Chi-square were used to test the hypotheses of the study

Presentation of Findings

Table 5: Frequency Distribution of Socio–Demographic Characteristics of Respondents

Variables	Frequency	Percentage
Age		
18-30	51	25.5
31-40	87	43.5
41-50	24	12
51-60	35	17.5
Above 60	3	1.5
Educational qualification		
No formal education	1	0.5
Primary school	10	5
SSCE	26	13
OND	21	10.5
HND	54	27
B.Sc.	73	36.5
M.Sc.	15	7.5
Employment status		
Unemployed	32	16

Employed	110	55
Self employed	58	29
Marital status		
Single	37	18.5
Married	140	70
Divorced	9	4.5
Widow	14	7
Number of Children		
None	42	21
One	12	6
Two	60	30
Three	64	32
Five or more	22	11
Tribe		
Yoruba	162	81
Igbo	35	17.5
Hausa	3	1.5
Religion		
Christianity	158	79
Muslim	40	20
Others	2	1

From table 1, it was observed that the largest age group was 31-40 (87 persons or 43.5% of the sample). The distribution showed that females from all age groups were well represented. For educational qualifications, the largest group were those with B.Sc. degrees (73 individuals or 36.5% of the sample). This implied that the majority of the respondents were fairly educated. In terms of employment status, the largest group were those who were employed (110 individuals or 55% of the sample). In this study, the married formed the majority of the respondents, accounting for 70%. Considering employment status, the largest group were those who were employed (110 individuals or 55% of the sample). In terms of marital status, the largest group were those who were married (140 individuals or 70% of the sample). Regarding the number of children, the largest group were those with three children (64 individuals or 32% of the sample). In terms of tribe, the largest group was Yoruba (162 individuals or 81% of the sample). In terms of religion, the largest group was Christianity (158 individuals or 79% of the sample). These results provide a general overview of the distribution of individuals in the sample based on the six variables.

Result of Hypotheses

Hypothesis 1: There is no Significant Association between the Socio-Demographic Characteristics of the Respondents and knowledge on Genetic Testing

The socio-economic characteristics considered were age, educational qualification, employment status, marital status, number of children, tribe and religion. The significant relationship was determined at 0.05 level. The chi-square statistical analysis revealed that there was a significant association: between Educational qualification and knowledge on genetic testing (χ^2=41.64, p-value=0.00) and between Tribe and knowledge on genetic testing available to the respondents (χ^2=12.60, p-value=0.00).

Table 2: Test of Significant Association between the Socio-Demographic Characteristics of the Respondents and Knowledge on Genetic Testing using Chi-Square

Variables	**χ^2**	**df**	**p-Value**	**Decision**
Age	0.44	4	0.98	NS
Educational qualification	41.64	6	0.00	S
Employment status	2.73	2	0.26	NS
Marital status	2.49	3	0.48	NS
Number of children	3.38	4	0.50	NS
Tribe	12.60	2	0.00	S
Religion	0.05	2	0.97	NS

NS = Not Significant
S = Significant

Hypothesis 2: There is no Significant Association between the Socio-Demographic Characteristics of the Respondents and their Attitude towards Genetic Testing

The chi-square statistical analysis showed that there was a significant association between Religion and attitude of women towards genetic testing (χ^2=7.97, p-value=0.02) at 0.05 level of significance. There was no significant relationship between (Age, Educational qualification, Employment status, Marital status, Number of children, and Tribe) and attitude towards genetic testing.

Table 3: Chi-Square Test of Significant Association between the Socio-Demographic Characteristics of the Respondents and their Attitude towards Genetic Testing

Variables	**χ^2**	**df**	**P-Value**	**Decision**
Age	4.95	4	0.29	NS

Educational qualification	6.89	6	0.33	NS
Employment status	2.57	2	0.28	NS
Marital status	3.20	3	0.36	NS
Number of children	1.96	4	0.74	NS
Tribe	3.16	2	0.21	NS
Religion	7.97	2	0.02	S

NS = Not Significant
S = Significant

Hypothesis 3: There is no Significant Relationship between Genetic Risk Information and Attitude towards Genetic Testing

PPMC was used to test for significant relationship between genetic risk information and attitude of the respondents towards genetic testing. The significance of this association was determined at 0.05 using Cronbach's Alpha. The correlation test showed a significant relationship between genetic risk information and attitude towards genetic testing (r= 0.17, p-value = 0.02).

Table 4: PPMC Test of Significant Relationship between Genetic Risk Information and Attitude towards Genetic Testing

Variables	**r**	**p-Value**	**Decision**
Relationship between genetic risk information and attitude towards genetic testing	0.17	0.02	S

S = Significant

DISCUSSION

The results of the study revealed that the respondents had positive knowledge on genetic testing based on educational qualification and tribe. This suggests that age, employment status, marital status, number of children and religion did not have a significant impact on the knowledge individuals have on genetic testing. On the other hand, the study found a significant positive relationship between religion, genetic risk information and attitude toward genetic testing. This suggests that religion and exposure to genetic risk information play a role in shaping individuals' attitudes toward genetic testing. This indicates that the type of religion practiced by an individual can determine the attitude towards genetic testing and the more access to genetic risk information individuals have, the more positive their attitude toward genetic testing will be. In conclusion, these results suggest that while individual factors such as age, employment status, marital status, number of children, and tribe did not significantly impact the attitude of individuals towards genetic testing, educational qualification and religion play a role in restructuring individuals'

attitudes towards genetic testing. Additionally, the availability of genetic risk information positively influences individuals' attitudes toward genetic testing.

CONCLUSION

Based on the results of the study, it was concluded that educational qualification and tribe influence the knowledge of the women on genetic testing. But age, employment status, marital status, number of children and religion did not influence their knowledge on genetic testing. Moreover, religion has a strong relationship with the attitude of the respondents towards genetic testing. Also, there was a significant association between genetic risk information and the attitude of the respondents towards genetic testing. However, age, employment status, marital status, number of children and tribe do not have any significant association with genetic risk information and attitude toward genetic testing. This suggests that there may be other factors that influence an individual's attitude toward genetic testing, such as cultural beliefs, religious affiliation and personal experiences among others.

From the findings, it was recommended that more education and awareness campaigns be organised to educate individuals about genetic testing, particularly in areas where access to information and healthcare services may be limited or not accessible. This could involve partnerships with local organisation, community leaders, religious leaders, teachers, counsellors, policy makers, in addition to improved access to information, collaboration with Health Care Providers, Promoting Ethical and Legal Considerations, Encouraging More Research in other climes to reach the global population. Moreover, Reproductive Genetic Technology (RGT) is an implication for ethical and religious bodies like Judaism, Christianity and Islam all because prenatal genetic testing can influence the decision of parents to abort a pregnancy. Also, the three religions are of different opinions on the beginning of human life with different doctrines to back it up (Peter, Steven, Sohiel, Makenna, Ameen, 2024). It is noteworthy that genetic testing may prompt complex moral dilemma because patients may find it difficult to reconcile their religious values with the ambiguity of genetic risk and the terrible choices they may need to make sometimes. Even genetic professionals have their share of the issues because they may experience conflicts concerning how to respond when a client’s religious belief influences him or her to make decisions that are against their medical interest. For example, religious law prohibits abortion, but some religious individuals often opt to have their pregnancy terminated if it is deformed while others usually prefer to depend on God for a miracle.

RECOMMENDATION

Based on the results of the study, the following recommendations were deduced:

1. Enhanced Access to Information: The availability of information and resources on genetic testing can be improved through the development of educational materials, such as brochures, posters, handbills and websites, which can be easily accessible, with stimulating captions and understandable to the public irrespective of the age and status.
2. Sensitisation of women and girls on the importance of genetic testing: A widespread campaign should be conducted to educate individuals especially women and girls about the availability, importance, and potential benefits of genetic testing. This should be made up of

workshops, seminars and public meetings to make people to better understand the subject and ginger a positive attitude towards the genetic testing.

3. Targeted Campaigns: Targeted campaigns aimed at specific populations e.g. in religious centres, markets, schools, health care centres, palaces, village squares or town halls etc., where with low educational qualifications, could be reached more effectively to enhance their knowledge, to be equipped with genetic risk information and general understanding on genetic testing. This could involve partnerships with local organisations, community leaders, market leaders and health care providers to reach these populations.
4. Synergy among Health Care Providers: Strong collaboration between health care providers, genetic counselors, and other healthcare professionals could ensure that individuals have access to accurate and timely information on genetic testing, as well as access to genetic testing services.
5. Promoting Ethical and Legal Considerations: It is important to ensure that the public highly informed about the ethical and legal considerations surrounding genetic testing, such as genetic discrimination, privacy, and confidentiality. This can be done through the development of educational materials and adequate sensitisation on the subject matter.
6. Giving Room for Further Studies: Further researches in different parts of Nigeria are needed to better understand the attitude and beliefs of individuals towards genetic testing, as well as to assess the impact of different educational and sensitisation programmes on the subject matter. This will help to improve future campaigns and ensure that they are effective in promoting greater knowledge and understanding on genetic testing

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RESOURCE FACTORS AND SKILLS SUPPLY TO LABOUR MARKETS IN PRIVATE UNIVERSITIES IN SOUTHWESTERN NIGERIA

By

Opeyemi Seyi OLASUNKANMI (Ph. D)
Department of Educational Management,
University of Ibadan, Ibadan, Nigeria.
Email: oskomus@gmail.com
Tel: +2347037710690

Abstract

The study investigated resource factors and skills supply to labour markets in private universities in southwestern Nigeria. Skills acquired by graduates are important to economic productivity and economic development. Despite its importance, different stakeholders have been complaining of inadequacy of these skills in university graduates especially among fresh graduates in Nigeria. The descriptive survey research design was adopted for the study. Multi stage sampling procedure was used. At the first stage, purposive sampling technique was used to select 10 private universities that have been in operation for minimum of ten years in Southwestern, Nigeria. At the second stage, simple random sampling technique was used to select 173 Heads of Departments in the sampled faculties. At the third stage, human resource managers in seven firms (Communication, Banking, Education, Health, Judiciary, Manufacturing/Construction and Agricultural) were sampled for the study. The instruments used were Questionnaire on Skills Supplied by Private Universities to Labour Market (= 0.89) and Questionnaire on Resource Factors and Skills Supply in Private Universities (r = 0.81). Statistical tools used were Frequency counts, Pearson product-moment correlation and Multiple regression at 0.05 level of significance. Private universities met the benchmark of National Universities Commissions but about 53.2% of their academic staff were either on part time / adjunct appointment or on sabbatical appointment. There were positive significant relationships between resource factors and skills supply (r=0.201 P<0.05). Resource factors jointly contributed to skills supply by private universities ($F_{(4,18)}$ = 176.07; Adj. R^2=0.64), accounting for 64.0% of its variance. Academic staff profile (β=0.55) and availability of ICT (β=0.35) relatively contributed to skills supply by private universities. It was recommended that management of private universities in southwestern Nigeria should increase the number of full-time academic staff and part time teaching staff should be discouraged so as to have more academic staff that will be fully on ground for the attention of students.

Keywords: Resource Factors, Skills Supply, Labour Market

Introduction

The problem of skills supply in Nigerian universities poses serious challenge to different stakeholders and especially to the employers in labour market. There have been constant complaints of not seeing the needed skills among fresh graduates who want to take up appointment in different establishments. Supply of skills to labour market is the sole responsibility of universities through proper training of students who will turn out to be graduates that will fill different vacancies in labour market. But there are anxieties by employers of labour over the skills possessed by graduates who work in different organisations and employers want their employees to be professionally competent in their chosen careers (Sodipo, 2014). Furthermore, Sodipo (2014) stated that every employer desires their employees to be well prepared with matching life supporting abilities to perform excellently at work and to possess such ability to: solve problems, think reflectively, engage in team-work, communicate effectively, have good personality, organize thing orderly, to possess integrity, self-discipline, self-esteem and leadership skills, rising in equality, technologies usage skills, and the ability to translate ideas to actions.

It is highly disheartening that the expectations of employers about the quality of graduates needed in different establishments are not found in them, they have to give further training to newly employed staff in order to meet up with the requirements from fresh graduates (Olasunkanmi & Ayeni 2020). According to Ige (2013), private universities came into existence in Nigeria as a result of many reasons: fall in the quality of university graduates, to create more access for students; constant strike in public universities, students' unrest and cultism in public universities, and limited and decaying infrastructural facilities in public universities.

One would expect that private universities in Nigeria cover up the gap identified in public universities and as well justify the reasons of their establishment, yet, there are lots of complaints that private universities are not up to the task, especially in the area of their products turning in to the labour market. Olasunkanmi & Ayeni (2020) stated that skills supplied by private universities do not meet up with the skills needed by employers of labour. This was measured in terms of supply of skills in private universities as a correlate of skills demanded by employers. Olasunkanmi & Ayeni (2020) submitted that, though the employers of labour were satisfied with the job performance of private university graduates in their various establishments, this was not without the additional training given to the newly recruited staff.

Skills supplied to labour markets is a function of many factors, most importantly, it is a function of resources used in training the products (graduates). The resource factors as considered in this study are: academic staff quality, availability of ICT facilities and accessibility of ICT facilities.

The academic staff strength in universities, being an essential factor that could determine the readiness of graduates for work and performance level of graduates on the job, seems not in conformity with NUC regulations. A close look at universities' academic staff strength in private universities in terms of quality and quantity shows that many of the universities today do not meet

up with the NUC stipulations on the strength of academic staff. Abiodun-Oyebanji (2012) and Okojie (2008) pointed out that the major problem confronting Nigerian universities system is staffing. The studies stated that many of Nigerian universities, especially private universities, did not meet up with the needed quality and quantity of teaching staff to handle teaching and research work.

Olorunsola and Arogundade (2012) asserted that teaching staff members are the major determinants of success in university systems. They stressed further that accomplishment of goals of any educational system or its failure relies on the academic staff. All educational institutions, to function properly, must have sufficient and suitable skilled manpower. Other resources such as equipment, technological facilities and physical facilities are to complement the efforts of teaching staff in the education industry. So, if there is deficiency in number, qualification and rank of academic staff in universities, it may lead to poor training of students and this could invariably affect the job performance of graduates in labour market. Abiodun-Oyebanji (2012) stated that if staffing of universities does not conform with NUC regulations, then, there could probably be excess workload on the staff. When there is excess workload on staff, teaching and training of students may be affected, leading to poor preparation of students. This could affect job performance in labour market after graduation.

Furthermore, Oyesiku (2010), revealed that universities and other higher institutions of learning are criticized for deterioration in the educational outputs, as a result of decline in numbers and quality of members of academic staff, teaching facilities, insufficient funding and neglect of government or private sectors' meaningful contributions to educational system and the curricula for teaching students. Oyesiku (2010) reported that there is a serious decrease in the value of graduates turned out to labour market due to the fallen standards of education.

Apart from the aforementioned, Information Communication and Technology also plays a vital role in learning, teaching and research process. Its usage widens the knowledge of both staff and students and exposes them to better ways of learning new things. Anyira (2011) submitted that the role of ICT in university education cannot be underestimated because it forms a very important part of disseminating information among members of staff and from staff to students. It plays definite role in the field of education to meet the needs of students, staff members and researchers in the area of communication, teaching, research and community service. However, it seems that the extent of accessibility and utilization of ICT in most of Nigerian Universities is very low. Among the problems facing accessibility and utilization of ICT facilities in Universities are poor power supply, low access speed and poor network providers. Nigeria is struggling with the problem of insufficiency in ICT infrastructure in many higher institutions of learning. If the accessibility and utilization of ICT to university staff and students is low, it may not adequately assist the staff in preparing students for job after schooling in order to meet up with the technological advancement in the world.

According to Philip, Oluwagbemi and Oluwaranti (2010), tertiary institutions in Nigeria lacked adequate ICT facilities. The study submitted that in most Nigerian universities, computers are insufficient for students to use and very few of these universities have internet facilities and enabling environment such as campus–wide network (CWN). They stated further that internet services are not available in many higher institutions, and where they are available, they are faced with one challenge or the other such as electricity to power the internet equipment. Bola and Ogunlade (2012) observed that many students in Nigeria universities do not have access to internet service which may lead to unfamiliarity of basic knowledge in the ICT which may affect the graduate labour job performance.

There is no much difference in the problem facing public universities and private universities in Nigeria, according to Adavbiele (2016), many of the ICT facilities in term of campus wide area networking, Very Small Aperture Terminal (VSAT) access to the internet and e-learning course deliveries are available in most of the private universities, but they are not accessible to students and staff due to continuous power outage. It was reported that not very many of the private higher institutions in the country are capable of meeting the ICT needs of their staff and students. Many private university lecturers and students have to depend on their personal internet facilities browsers like modems to be able to connect to the internet. It is against this background that the study examined resource factors in private universities and skills supply to labour market in Southwestern Nigeria.

Statement of the Problem

Skills acquired by graduates are important to economic productivity and economic development. Despite its importance, different stakeholders have been complaining of inadequacy of these skills in university graduates especially among fresh graduates in Nigeria. Different studies reported that poor acquisition of skills by fresh graduates, which is reflected in their performance in labour market, could be attributed to poor training received during their studies in the universities. The resource factors used in training them, such as quality of academic staff, availability and accessibility of facilities like information communication and technology, could determine the level of skills acquired. Extant studies paid much attention on skills-mismatch, employers' satisfaction and skills gap assessment among public university graduates with little efforts on resource factors as it affects supply of skills to labour market. Many of these studies identified the problem of skills supplied to insufficiency of learning facilities, bad attitude of government to education, overcrowded classrooms, poor funding, outdated curriculum, deterioration in quality of teaching staff with several recommendations to ameliorate the problem of skills supply by universities. But this study investigated the resource factors (academic staff profile, accessibility and availability of ICT facility) skills supply in private universities to labour market.

Purpose of the Study

Generally, the study investigated resource factors in private universities and skills supply to labour market in Southwestern Nigeria. Specifically, the study investigated:

i. extent to which skills are supplied by private universities to labour;
ii. level of compliance of academic staff profile in private universities with NUC benchmark;
iii. state of availability and accessibility of ICT facilities in private universities in Southwestern Nigeria;
iv. difference in skills supplied by private universities in Southwestern Nigeria;
v. joint and relative contributions of resource factors and skills supplied by private universities in Southwestern Nigeria.

Research Questions

The following research questions were raised to guide the study:

1. What is the level of compliance of academic staff profile of private universities with NUC benchmark?
2. What is the extent of availability of ICT facilities among private universities in Southwestern Nigeria?
3. What is the level of accessibility to ICT facilities among private universities in Southwestern Nigeria?

Hypotheses

The following hypotheses were formulated to guide the study:

H_{01}: There is no significant relationship between resource factors and skills supplied to labour market in Southwestern Nigeria.

H_{02}: Resource factors in private universities (academic staff profile of private universities, accessibility and availability of ICT facility) will not significantly contribute to skills supplied to labour market in Southwestern Nigeria.

H_{03}: There is no significant joint contribution between resource factors in private universities (academic staff profile of private universities, accessibility and availability of ICT facility) and skills supplied to labour market in Southwestern Nigeria.

METHODOLOGY

Research Design

Descriptive survey research design of *ex-post facto* type was adopted. This was considered appropriate because the study was a description of existing characteristics of the university and the labour market. Also, it enabled the researcher to use analytical methods to estimate the values of the variables and estimate the relationship between them.

Population of the Study

The population of the study consisted of all the Heads of Departments in private universities that have been in operation for minimum of ten years in Southwestern, Nigeria. The population of the study also covered the human resource managers (HRMs) of firms in the key sectors of Nigeria economy in the Southwestern Nigeria.

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Table 1: List of Accredited Private Universities that have been in Operation for Minimum of 10 Years in Southwestern Nigeria

S/N	Name of Private Universities	Year Established	Number of Faculty/ College	Head of Department
1	Babcock University, Ilisan Remo Ogun State	1999	8	36
2	Bowen University, Iwo, Osun State	2001	6	23
3	Covenant University, Ota, Ogun State	2002	4	23
4	Pan-African University, Lagos, Lagos State	2002	3	12
5	Redeemers University, Ede, Osun State	2005	6	19
6	Ajayi Crowther University, Oyo, Oyo State	2005	7	19
7	CETEP City University, Lagos, Lagos State	2005	4	19
8	Bell University of Technology, Ota, Ogun State	2005	5	33
9	Lead City University, Ibadan, Oyo State	2005	4	19
10	Crawford University, Igbesa, Ogun State	2005	5	19
11	Crescent University, Abeokuta, Ogun State	2005	5	17
12	Joseph Ayo Babalola University, Ikeji-Arakeji, Osun State	2006	7	36
13	Fountain University, Osogbo, Osun State	2007	4	13
14	Wesley University of Science and Technology, Ondo, Ondo State	2007	5	28
15	The Achievers University, Owo, Ondo State	2007	4	20
16	Caleb University, Km 15, Ikorodu-Itoikin Road, Imota, Lagos State	2008	3	26
	Total			**362**

Source: National Universities Commission

Sample and Sampling Techniques

Multi stage sampling procedure was adopted for the sampling. At the first stage, purposive sampling technique was used to select 60% of private universities that have been in operation for minimum of ten years in Southwestern, Nigeria. Purposive sampling technique was used because it is expected that such universities should have produced enough graduates working in different establishments. This gave a total number of 10 universities. At the second stage, simple random sampling technique was used to select 70% of the faculties in the sampled universities and all Heads of Departments in sampled faculties were chosen using total enumeration technique. At the third stage, seven firms in the key sectors of Nigeria economy were purposively sampled, because it is believed that these are the sectors that most of the private universities graduates could be located. These sectors are: Communication, Banking, Education, Health, Judiciary, Manufacturing/Construction and Agricultural.

Also, 25 employers from communication, 25 from Banking, 41 from Education, 30 from Health, 24 from Judiciary, 30 from Manufacturing/Construction and 25 from Agriculture were randomly sampled from private and public labour organisations in capital cities of the Southwestern states, making a total of 200 employers.

Table 2: List of Sampled Universities and Faculties

S/N	Name of Private Universities	Year Established	Faculties / Colleges	No. of Depts	Sampled Faculties (70%)
1	Babcock University, Ilisan Remo, Ogun State	2001	Administration Agriculture Arts and Humanities Arts Law / Legal Studies Medical/Pharm/Health Sciences Sciences Social Sciences	1 3 2 5 1 6 11 7	Administration Agriculture Arts Medical/Pharm/Health Sci. Sciences Social Sciences
2	Bowen University, Iwo, Osun State	2001	Health Sciences Agriculture Humanities Law Sciences and Science Education Social and Management Sciences	3 3 4 1 6 5	Agriculture Humanities Sciences & Sci. Education Social & Mgt. Sciences
3	Covenant University, Ota, Ogun State	2002	Business and Social Sciences Engineering Leadership Development Studies Science and Technology	6 5 4 8	Business and Social Sci. Engineering Science and Technology
4	Redeemers University, Ede, Osun State	2005	Administration Agriculture Arts Law Sciences Social Sciences	1 2 5 1 6 4	Agriculture Arts Sciences Social Sciences
5	Ajayi Crowther University, Oyo, Oyo State	2005	Education Arts and Humanities Engineering and Environmental Studies Law Natural Sciences Social Sciences Management Sciences	2 4 2 1 6 3 1	Arts and Humanities Engineer. & Envir. Studies Natural Sciences Law Social Sciences
6	Lead City University, Ibadan, Oyo State	2005	Law Arts and Education Social Sciences Sciences	1 7 5 6	Arts and Education Social Sciences Sciences
7	Crescent University, Abeokuta, Ogun State	2005	Bola Ajibola College of Law Natural and Applied Science Environmental Sciences Social and Management Sciences	2 4 3 6	Bola Ajibola College of Law Natural and Applied Sci.

			Information and Comm. Tech.	2	Environmental Sciences Information and Comm. Tech
8	Joseph Ayo Babalola University, Ikeji-Arakeji, Osun State	2006	Agricultural Sciences Environmental Sciences Humanities Natural Sciences Social Sciences Management Sciences Law	5 6 5 6 7 6 1	Agricultural Sciences Environmental Sciences Natural Sciences Social Sciences Management Sciences
9	Wesley Uni. of Science and Technology, Ondo, Ondo State.	2007	Pure and Applied Sciences Environmental Sciences and Mgt. Social and Management Science	11 7 8	Pure and Applied Sciences Social and Mgt. Science
10	Caleb Uni. Lagos, Lagos State	2008	Administration Agriculture Engineering/Technology/Environmental Sciences Social Sciences	1 5 4 14 4	Administration Agriculture Engineering/Tech/ Environ. Social Sciences
Total Sample					**178**

Research Instruments

Two sets of instruments were used in collecting data for the study. The first instrument, tilted "Questionnaire on Skills Supplied by Private Universities to Labour Market (QSSPULM)" a self-designed questionnaire comprises of three Sections for employers of labour in the capital cities of Southwestern States. The instrument was designed to find out the types of skills supplied by private universities to labour market. The second instrument, a self-designed questionnaire comprised two Sections, was designed for the heads of Departments of the private universities titled "Questionnaire on Resource Factors and Skills Supply in Private Universities (QRFSSPU)".

Validity of Research Instruments

Face, content and construct validity were adopted for the instruments. Face validity was obtained to test if the content appear to be suitable, content validity was obtained to test the representative of what the instruments were aim to measure while construct validity was measured to test the correctness of the concepts to be measured. The instruments were validated by subjecting the drafts to the experts in the field of Educational Management, Institute of Education, and Quality Assurance Unit of University of Ibadan. Various suggestions, advices and ideas were incorporated in the final draft before administration.

Reliability of Research Instrument

A field test was conducted to establish the reliability of the instruments. This was done by administering 10 copies of Questionnaire on Skills Supplied by Private Universities to Labour Market (QSSPULM) to employers of labour within Osogbo metropolis. Also, 10 copies of Questionnaire on Resource Factors and Skills Supply in Private Universities (QRFSSPU) were administered to 10 different heads of departments at Fountain University, Osogbo, Osun State, which is not part of the selected sample for the study. These were subjected to reliability analysis using Cronbach alpha statistics. Questionnaire on Skills Supplied by Private Universities to Labour Market (QSSPULM) yielded reliability coefficient of $r = 0.89$, Questionnaire on Resource Factors and Skills Supply in Private Universities (QRFSSPU) yielded reliability coefficient of $r = 0.81$ These coefficients of reliability show that the instruments were reliable.

Administration of Research Instruments

The instruments were administered personally by the researchers with the help of two (2) research assistants who were trained on the administration of the instruments. One hundred and ninety-five copies of QSSPULM were administered and one hundred and seventy-three were retrieved and found useful for the study (88.7%). Also, one hundred and seventy-eight copies of QRFSSPU were administered out of which one hundred and seventy-three (97.2%) were found useful for the study through data cleaning.

Method of Data Analysis

Data obtained from the field were analyzed using descriptive statistics such as frequency, percentage and mean scores to answer the research questions. Hypothesis 1 was tested with the

use Pearson Product Moment Correlation. Hypotheses 2 and 3 were tested with Multiple Regression Analysis. All analyses were carried out at 0.05 level of significance.

Results

Research Questions

RQ 1: What is the level of compliance of academic staff profile of private universities with NUC benchmark?

Table 3a: Level of Compliance of Academic Staff Profile of Private Universities with NUC Benchmark

Scale	Frequency	Percentage
Very High	24	13.9
High	51	29.5
Moderate	95	54.9
Low	3	1.7
Total	173	100.0
	Mean = 2.56	

Notes: *Mean responses ranges from 0 to 1.4 = Low; 1.5 to 2.4 = Moderate; 2.5 to 3.4 = High; 3.6 to 4.0 = Very High*

Table 3b: Nature of Appointment of Academic Staff of Private Universities

Categories of Staff	Frequency	Percentage
Full Time Appointment	81	46.8%
Part Time / Adjunct Appointment	55	31.8%
Sabbatical Appointment	37	21.4%
Total	**173**	**100**

Answers to research question 1 are presented in Tables 3a and 3b. The data show the level of compliance of academic staff profile of private universities in Southwestern Nigeria and the percentage of nature of appointment of academic staff in private universities in Southwestern Nigeria. It was revealed from Table 3a that 13.9% of the sampled universities indicated that the compliance level of academic staff profile in line with NUC benchmarks was very high, 29.5% pointed out that level of compliance was high, 54.9% of the sampled universities submitted that

level of compliance of academic staff profile in line with NUC benchmark was moderate, while 1.7% indicated that the level of compliance was low.

Also, Table 3b revealed that 46.8% of the lecturers in private universities were full time lecturers; 31.8% of them were part time / adjunct lecturers, while 21.4% were on sabbatical appointment.

In Table 3a, the mean is 2.56, this implies that the level of compliance of academic staff in private universities with NUC benchmark was high, which means many of the private universities complied with the NUC benchmark on the minimum standard of academic staff. But Table 3b revealed that below average (46.8%) of the academic staff in private universities were on full time appointment. This implies that most of the private universities met up with the minimum standard of academic staff but about 53.2% of their academic staff were either on part time / adjunct appointment or on sabbatical appointment.

RQ 2: What is the extent of availability of ICT facilities among private universities in Southwestern Nigeria?

Table 4: Extent of Availability of ICT Facility among Private Universities in Southwestern Nigeria

Items	Highly Available	Moderately Available	Slightly Available	Not Available	Mean	SD
Campus Area Network	70 (40.5)	79 (45.7)	15 (8.7)	9 (5.2)	3.21	0.811
Local Area Network	60 (34.7)	74 (42.8)	24 (13.9)	15 (8.7)	3.03	0.914
Wide Area Network	54 (31.2)	74 (42.8)	18 (10.4)	27 (15.6)	2.90	0.969
Cybercafe	88 (50.9)	60 (34.7)	16 (9.2)	9 (5.2)	3.31	0.846
Computer- based Test (CBT) Centre for students to write exams	70 (40.5)	46 (26.6)	27 (15.6)	30 (17.3)	2.92	0.875
Online/E-learning course delivery	40 (23.1)	27 (15.6)	64 (37.0)	42 (24.3)	2.38	0.965
Teleconferencing course delivery	18 (10.4)	30 (17.3)	37 (21.4)	88 (50.9)	1.87	0.649
E – library	122 (70.5)	42 (24.3)	6 (3.5)	3 (1.7)	3.64	0.638
Projectors for course delivery	87 (50.3)	57 (32.9)	23 (13.3)	6 (3.5)	3.30	0.830
Interactive white board	87 (50.3)	18 (10.4)	32 (18.5)	36 (20.8)	2.90	0.888
Email service for staff and students	134 (77.5)	30 (17.3)	9 (5.2)	– (0.0)	3.72	0.553
Weighted Mean (WM) = 3.02						

Decision Level (DL) = 2.5; WM > DL

Note: Figures in Parentheses are Percentages

Table 4 presents data on the extent of availability of ICT to staff and students of private universities in southwestern Nigeria. The findings showed the ICT facilities that were available in most of the private universities in Southwestern Nigeria were: Campus Area Network (mean = 3.21); Local Area Network (mean = 3.03); Wide Area Network (mean = 2.90); Cybercafe (mean = 3.31); Computer Based Test (CBT) Centre for students to write exam (mean = 2.92); E – library (mean = 3.64); Projectors for course delivery (mean = 3.30); Interactive white board (mean = 2.90), Email service for staff and students (mean =3.72). The data further show that the following ICT facilities were not available in most of the private universities in Southwestern Nigeria according to the data gathered: Online / E-learning course delivery (mean = 2.38); Teleconferencing course delivery (mean = 1.87). The average mean of the data is given as 3.10 which is greater than 2.50. This implies that the ICT facilities were moderately available in private universities in Southwestern Nigeria.

RQ 3: What is the level of accessibility of ICT facilities among private universities in Southwestern Nigeria?

Table 5: Level of Accessibility of ICT Facility among Private Universities in Southwestern Nigeria

Items	Highly Accessible	Moderately Accessible	Slightly Accessible	Not Accessible	Mean	SD
Campus Area Network	64 (37.0)	78 (45.1)	22 (12.7)	9 (5.2)	3.14	0.831
Local Area Network	60 (34.7)	70 (40.5)	31 (17.9)	12 (6.9)	3.03	0.898
Wide Area Network	51 (29.9)	67 (38.7)	31 (17.9)	24 (13.9)	2.84	0.998
Cybercafe	75 (343.4)	70 (40.5)	13 (7.5)	15 (8.7)	3.18	0.909
Computer Based Test (CBT) Centre for students to write exam	60 (34.7)	47 (27.2)	27 (15.6)	39 (22.5)	2.74	0.652
Online / E-learning course delivery	43 (24.9)	33 (19.1)	45 (26.0)	52 (30.1)	2.38	0.555
Teleconferencing course delivery	18 (10.4)	40 (23.1)	27 (15.6)	88 (50.9)	1.93	0.890
E – library	119 (68.8)	45 (26.0)	6 (3.5)	3 (1.7)	3.62	0.664
Projectors for course delivery	72 (41.6)	67 (38.8)	22 (12.7)	12 (6.9)	3.15	0.896
Interactive white board	84 (48.6)	24 (13.9)	23 (13.2)	42 (24.3)	2.87	0.872
Email service for staff and students	122 (70.5)	30 (17.3)	18 (10.4)	3 (1.7)	3.57	0.749

Weighted Mean (WM) = 2.95

Decision Level (DL) = 2.5; WM > DL

Note: Figures in Parentheses are Percentages

Extent of accessibility of ICT facilities in private universities in Southwestern Nigeria is presented in table 5. The result revealed that the following ICT facilities were accessible to staff and students in private universities: Campus Area Network (mean = 3.14); Local Area Network (mean = 3.03); Wide Area Network (mean = 2.84); Cybercafe (mean = 3.18); Computer Based Test (CBT) Centre for students to write exam (mean 2.63); E – library (mean = 3.62); Projectors for course delivery (mean = 3.15); Interactive white board (mean = 2.87); and Email service for staff and students (mean = 3.57). From the results in the Table 5, the respondents stated that the following ICT facilities were not accessible to staff and students of private universities, Online / E-learning course delivery (mean = 2.38) and Teleconferencing course delivery (mean = 1.93).

The weighted average mean of the data is given as 2.95 which is greater than 2.50, the acceptability level. The implication of this is that most of the ICT facilities available in private universities in Southwestern Nigeria were also moderately accessible to staff and students.

Hypotheses

H_{01}: There is no significant relationship between resource factors and skills supplied to labour market by private universities in southwestern Nigeria.

Table 6: Relationship between Resource Factors and Skills Supplied to Labour Market by Private Universities in Southwestern Nigeria

Variable	N	Mean	Std. Dev.	r	P value	Remarks
Resource Factors	173	17.3012	3.2201			
Skills Supplied	173	22.1301	5.4731	0.201	0.009	Significant

Table 6 presents result of hypothesis one formulated on relationship between resource factors and skills supplied by private universities to labour markets in Southwestern Nigeria. The results shows a significant relationship between resource factors and skills supplied by private universities ($r = 0.201$; $P < 0.05$). The hypothesis was therefore rejected at 0.05 level of significance. The implication of this is that resource factors used to train the graduates had significant relationship with skills supplied by private universities to labour market in Southwestern Nigeria. Mean value of resource factors was 17.3012 and mean value of skills supplied was 22.1301. This implies that though there was significant relationship between resource factors and skills supplied by private universities, skills found in labour markets was found to be on higher side. This could be as a result of additional training given by employers to private universities graduates in various

establishments. While the standard deviation values of the two variables are 3.2201 and 5.4831 respectively.

H_{02}: Resource factors in private universities (academic staff profile of private universities, accessibility and availability of ICT facility) will not significantly have relative contribution to skills supplied to labour market by private universities in Southwestern Nigeria.

Table 7: Relative Contribution of Resource Factors (Academic Staff Profile of Private Universities, Accessibility and Availability of ICT Facilities) to Skills Supplied to Labour Market by Private Universities in Southwestern Nigeria

Dependent Variable	Independent Variables	Unstandardized Coefficient		Stand. Coefficient	T	Sig.
		B	Std. Error	Beta Contribution		
Skills Demanded by Employers	(Constant)	21.259	2.074		10.249	0.000
	Academic Staff Profile	0.247	0.078	0.549	3.163	0.007
	Availability of ICT	0.404	0.101	0.352	3.998	0.241
	Accessibility of ICT	0.365	0.070	0.450	5.194	0.018

Table 7 reveals relative contribution of academic staff profile, availability and accessibility of ICT facilities to skills supplied by private universities, expressed as beta weights: academic staff profile ($\beta = 0.549$, $P < 0.05$), availability of ICT facility ($\beta = 0.352$, $P > 0.05$) and accessibility of ICT facility ($\beta = 0.450$, $P < 0.05$). Result from the table shows that two of the indicators of the independent variables in the model (academic staff profile and accessibility of ICT facilities) contribute significantly to skills supplied by private universities in southwestern Nigeria, while availability of ICT facilities was found to have no significant contribution to skills supplied by private university in Southwestern Nigeria.

H_{03}: There is no significant joint contribution between resource factors in private universities (academic staff profile of private universities, accessibility and availability of ICT facility) and skills supplied to labour markets by private universities in Southwestern Nigeria.

Table 8: Joint Contribution of Resource Factors (academic Staff Profile of Private Universities, Accessibility and Availability of ICT Facilities) and Skills Supplied to Labour Market by Private Universities in Southwestern Nigeria

Model	Sum of Squares	Df	Mean Square	F	Sig	Rmks
Regression	4770.390	3	1590.131			
Residual	2.655.234	169	9.031	176.067	0.004	Sig.
Total	7425.624	172				
R = 0.802						
R Square = 0.642						
Adjusted R Square = 0.639						
Std. Error of the Estimate = 0.859						

Table 8 presents the analysis of hypothesis three on joint contribution of resource factor indicators (academic staff profile of private universities, accessibility and availability of ICT facilities) and skills supplied to labour market by private universities in Southwestern Nigeria. The results show that there was significant joint contribution of resource factor indicators (academic staff profile of private universities, accessibility and availability of ICT facilities), and skills supplied to labour market by private universities in Southwestern Nigeria ($R = 0.802$; $R^2 = 0.64$; $F = 176.067$). This shows that all the variables of resource factor indicators (academic staff profile of private universities, accessibility and availability of ICT facilities) accounted for 64.0% of the variance in skills supplied to labour markets by private universities in Southwestern Nigeria. The remaining 36.0% might be captured by other exogenous variables that were not included in the study. Based on this, the joint contribution is shown to be significant ($F_{(4, 18)} = 176.067$; $P < 0.05$), therefore, the hypothesis was not accepted. This implies that resource factor indicators (academic staff profile of private universities, accessibility and availability of ICT facilities) have joint contribution to skills supplied by private universities to labour markets in Southwestern Nigeria.

Discussion of Findings

Level of Compliance of Academic Staff Profile of Private Universities with NUC Benchmark

Tables 3a and 3b present the level of compliance of academic staff profile of private universities in Southwestern Nigeria and the nature of appointment of academic staff in private universities in Southwestern Nigeria. It was revealed from Table 3a that 13.9% of the private universities indicated that the compliance level of academic staff profile which was in line with NUC

benchmarks was very high, 29.5% pointed out that level of compliance was high, 54.9% of the sampled universities submitted that the level of compliance of academic staff profile in line with NUC benchmarks was moderate, while 1.7% indicated that the level of compliance was low. The mean value of the table was given as 2.56 which implies that the aggregate compliance level of academic staff profile of private universities which was measured in terms of quality and quantity of academic staff is high.

In addition to this, Table 3b revealed that 46.8% of the lecturers in private universities were full time lecturers; 31.8% of them were part time/adjunct lecturers while 21.4% were on sabbatical appointment. This shows that 46.8% of academic staff of private universities were on full time appointments, while 53.2% of the academic staff of private universities in Southwestern were on either part time/adjunct or sabbatical appointments. The implication of this is that compliance level of many private universities with NUC benchmark is high, but about 53.2% of members of staff were either on part time/adjunct or sabbatical appointments. The finding negates the submission of Abiodun-Oyebanji (2012) who investigated human resource situation in Nigerian Universities, a case study of Ekiti State University, Ado-Ekiti and found that many universities did not conform with NUC regulation on staffing.

Not only that, findings on compliance level of academic staff in private universities was not in line with the findings of Ige (2013) who investigated the evolution of private universities in Nigeria: matters arising and the way forward concluded that most of the universities in Nigeria did not conform with the NUC regulations on staffing.

Extent of Availability of ICT Facility among Private Universities in Southwestern Nigeria

Extent to which ICT facility was made availability to staff and students of private universities in Southwestern Nigeria was investigated in research question 2. The finding revealed that the following ICT facilities were available in most of the private universities Campus Area Network (CAN), Local Area Network (LAN), Wide Area Network (WAN), cybercafe, Computer Based Test (CBT) Centre for students to write exam, E – library, Projectors for course delivery, Interactive white board, and E-mail service for staff and students. On the other hand, the finding revealed that the following ICT facilities were not available in most of the private universities in Southwestern Nigeria: Online / E-learning course delivery and teleconferencing course delivery.

The aggregate response of the finding revealed that ICT facilities were moderately available to staff and students of private universities in Southwestern Nigeria. This contradicts the findings of Egoeze, Akman and Palacios (2014) who evaluated the ICT infrastructure and application in Nigeria Universities and submitted that Nigeria universities are still low in provision of ICT facilities. Though the study of Egoeze et al (2014) on evaluation of ICT infrastructure and application in Nigeria Universities which revealed low provision of ICT facilities was conducted on public universities, but findings of this study revealed that ICT facilities were moderately available to staff and students of private universities in Southwestern Nigeria.

Also, the finding of this study on availability of ICT facilities to staff and students of private universities does not conform with the submission of Godwin and Johnson (2012) who carried out a study on labour market distortion and University graduate unemployment in Nigeria: issues and remedies, and concluded that ICT facilities are not available in Nigeria universities.

Level of Accessibility of ICT Facility among Private Universities in Southwestern Nigeria

The extent of accessibility of ICT facilities to staff and students of private universities in Southwestern Nigeria was presented in Table 5. The finding revealed that the following ICT facilities were accessible to staff and students of private universities: Campus Area Network (CAN), Local Area Network (LAN), Wide Area Network (WAN), Cybercafe, Computer Based Test (CBT) Centre for students to write exam, E – library, Projectors for course delivery, Interactive white board, E-mail service for staff and students. The finding on the other hand revealed that the following ICT facilities were not accessible to staff and students of private universities, Online / E-learning course delivery and Teleconferencing course delivery.

The weighted average mean of the table revealed that ICT facilities are moderately accessible to staff and students of private universities in southwestern Nigeria. It was also revealed that all the ICT facilities that are available to staff and students in most of the private universities are also accessible, but the level of availability of the ICT facilities (mean = 3.02) is greater than the level of accessibility (mean = 2.95).The finding on level of accessibility of ICT facilities to staff and students contradicts the submission of Egoeze, Akman and Palacios (2014) who investigated the evaluation of ICT infrastructure and application in Nigeria Universities and found out that Nigeria universities are low in utilization of ICT facilities. Also, the finding here negates the submission of Gambari and Chike-Okoli (2016) who investigated availability and utilization of information and communication technology (ICT) facilities in higher institutions in Niger state, Nigeria. It was concluded from their study that the level of utilization of ICT in higher institutions of Nigeria is low with reference to lack of network infrastructure, high cost of internet facilities, limited expertise and ICT skills level and lack of enabling environment.

Finding of the study corroborates the submission of Agim, Iroeze, Osuji and Obasi-Haco (2018) who investigated level of availability and utilization of information and communication technology facilities by students: A case study of Federal Polytechnic, Nekede, Owwerri, Imo State Nigeria and found out that ICTs are useful and accessible to students.

Relationship between Resource Factors and Skills Supplied to Labour Market by Private Universities in Southwestern Nigeria

Relative correlation of indicators of resource factors (academic staff profile, availability and accessibility of ICT facilities) to skills supplied by private university revealed that academic staff profile of private universities had the highest contribution to skills supplied to labour market, this is followed by accessibility of ICT facilities and availability of ICT facilities had the lowest contribution to skills supplied to labour market. Finding from the study further revealed that academic staff profile in private universities and accessibility of ICT facilities contributed to skills

supplied to labour market, while contribution of availability of ICT facilities to skills supplied to labour market was not significant.

Implication of the finding revealed that making ICT facilities available is not enough, but accessibility and utilization of such facilities by staff and students is more important. There are cases in many higher institutions where ICT facilities are provided for the use of university community, but to access and use them become challenges to the end users as a result of poor network infrastructure, problem of power supply, limited expertise of ICT skills and poor enabling environment.

Table 8 revealed joint correlation of resource factor indicators (academic staff profile of private universities, accessibility and availability of ICT facilities) and skills supplied to labour market by private universities in Southwestern Nigeria. The result shows joint contribution of resource factor indicators and skills supplied by private university to skills supplied to labour market. This implies that all the variables of resource factor indicators (academic staff profile of private universities, accessibility and availability of ICT facilities) accounted for 63.9% of the variance in skills supplied to labour market in Southwestern Nigeria. Based on this, joint contribution of resource factors have contribution to skills supplied by private universities to labour market. That is, personnel that train graduates in school, (quality and quantity of academic staff) and resources used to train them, such as availability and accessibility of ICT, all put together had significant joint contribution to skills supplied to labour market.

Conclusions

Based on the findings of the study, it was concluded that the level of compliance of academic staff in private universities with NUC benchmarks was high, but many of the academic staff in private universities in Southwestern Nigeria were on part time/adjunct or sabbatical appointments respectively.

It was also concluded that ICT facilities such as campus area network, local area network, wide area network, CBT, projectors for course delivery and so on were available to staff and students in private universities and as well were accessible to staff and students.

Finally, it was concluded that, among the resource factors indicators, academic staff profile of private universities contributed highest to skills supplied by private universities, followed by accessibility of ICT facilities and availability of ICT facilities had the lowest contribution to skills supplied to labour market. It was also concluded that taking all the resource factors together, the joint correlation with skills supplied to labour market by private universities was enhanced. If teachings in Nigerian universities are standard, it increases the quality of labour supply which has implication on the economy, businesses and individuals. It increases productivity, economic growth is enhanced, brings about new innovations, talents attraction and retention will also be enhanced in the labour.

Recommendations

The following recommendations were made:

It is recommended that there should be prompt feedback from employers of labour to the universities on the new trend of skills needed in labour market, so as to infuse such into academic curriculum of the universities.

Management of private universities in Southwestern Nigeria should increase the number of full time academic staff and part time teaching staff should be discouraged so as to have more academic staff that will be fully on ground for the attention of students.

Also, it is recommended that ICT facilities should be made available and accessible to staff and students. Availability is not enough, but accessibility and functionality of the facilities are more important.

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TECHNOLOGICAL INNOVATION IN SECONDARY SCHOOLS AS A TOOL FOR SUSTAINABLE DEVELOPMENT IN KWARA STATE, NIGERIA

Dr. Felicia K. OLUWALOLA[1], Dr. Ijeoma C. OGBUDINPKA[1,] Dr. Esther Oluwayemisi FAMAYE,[1] Prof. Patricia Agnes O. ETEJERE[1] & Dr. AJIBOYE, Samuel Kolawole[2]

[1]Department of Educational Management
Faculty of Education
University of Ilorin

[2]Department of Educational Guidance and Counselling
Faculty of Education
University of Ilorin

oluwalola.fk@unilorin.edu.ng/ogbudinkpa.ic@unilorin.edu.ng
/estherfamaye@gmail.com/ patetejere@unilorin.edu.ng/ ajiboye.sk@unilorin.edu.ng

+2348035997530/+2348033534617/+2348060233726/+2348033906833/+7031182748

Abstract

Technological innovation deals with using technology to address national problems through the use of resources without affecting future generations. At the same time, sustainable development covers economic, social, ecological, and environmental issues relating to the disposal of waste, provision of good drinking water, and food production. The study examined the impact of technological innovation on sustainable development in Kwara State. A descriptive survey was adopted. Five research questions were raised and answered. The population of the study comprised 2126 teachers while the sample consisted of 322 respondents selected through random sampling technique. Five hypotheses were formulated and tested at 0.05 level of significance. A structured questionnaire titled "Technological Innovation and Sustainable Development Questionnaire" (ILSDQ) was used to collect data for the study. Reliability analysis was carried out using the pilot test method and it yielded a coefficient of 0.71. Descriptive statistics methods of median were used to answer research questions while partial least squares structural equation modeling (PLS-SEM) was used to test the hypotheses. There was a high level of technological innovation that had a positive impact on sustainable development. The use of virtual reality and cloud computing was high. It was recommended that virtual reality and cloud computing should be used more to improve sustainable development.

Keywords: Technology, Innovation, Virtual reality, Waste Disposal, and Food Production

Introduction

Technological innovation has the potential to revolutionize the way we live, work, and interact with our environment, making it a crucial driver of sustainable development. However, effectively integrating technological innovation in secondary schools remains a significant challenge. Secondary schools play a vital role in shaping the minds and skills of future generations, and the incorporation of technical innovation in their curriculum and practices can equip students with the necessary tools to address complex sustainable development challenges. Nevertheless, numerous barriers, including inadequate infrastructure, limited resources, and insufficient teacher training, hinder the successful adoption of technical innovation in secondary schools.

Environmental problems such as global warming and the gradual reduction of available resources are general and threaten the continuous existence of the world (Hooks & Tang, 2013). Pollution is causing serious environmental issues due to improper disposal of waste. Hence, the United Nations is discussing the issue of sustainable development goals. The depletion rate of natural resources is alarming, which is detrimental to the survival of upcoming generations. Sustainable development is paramount for us since it acquaints us with requirements without compromising the ability of the forthcoming generations to provide for their requirements (Griggs et al., 2013). The fear of becoming extinct without natural resources is affecting the current generation, and they are changing towards sustainable development. We have reached a point where it is essential to ensure that human activities and the use of natural resources do not compromise the ability of future generations to enjoy a high quality of life. The increasing use of social media, virtual reality, and cloud computing in education reflects the growing role of technological innovations in advancing sustainable development.

Technological innovations can create an environment that fosters organizational growth by maximizing resource efficiency and gaining a competitive edge while managing operations with precision (El-Haddadeh, 2020; Klewitz & Hansen, 2014). The relationship between technological advancements and sustainable development is multifaceted, and influenced by various factors. Key innovations driving sustainable progress include virtual reality, social media, and cloud computing, all of which play pivotal roles in shaping a more sustainable future (Sampson, 2007). These technologies enable organizations to operate more efficiently, reduce environmental impact, and promote long-term sustainability.

Virtual reality (VR) is a sophisticated technology powered by intelligent computer systems, enabling users to experience three-dimensional environments in a simulated virtual world. This world, often built on imagination, symbols, and simulations, mirrors aspects of real life (Pallot, 2013). Virtual Reality is widely applied across various sectors, including education, entertainment, and agriculture, where it enhances learning, creativity, and problem-solving. One of VR's unique attributes is its ability to immerse users so deeply that they often forget the real world, responding to the virtual environment as if it were reality (Katy et al., 2016).

According to Bozgeyikli et al. (2016), VR creates a dynamic interaction between theoretical concepts and practical experiences within the virtual environment. Researchers have explored and developed numerous methods to make these virtual spaces more intuitive and user-friendly (Hale et al., 2014). Advancements in hardware technology, such as improved motion sensors and

interactive devices, have significantly enhanced the user experience, offering more seamless and immersive VR interactions (Boletsis, 2017).

In education, VR has become a powerful tool for helping students engage with and understand their surroundings. By offering realistic simulations, VR allows students to explore and solve real-world challenges, from local environmental issues to global concerns. For instance, Bozgeyikli (2016) highlights that students have been able to identify waste disposal challenges through VR simulations, learning the importance of proper waste management as a solution to this issue. As a result, students develop a strong awareness of environmental stewardship, growing up with a commitment to preserving the environment for future generations.

Social media platforms are web-based tools that allow individuals to create public or semi-public profiles within a bounded system and connect with others. These platforms enable users to share information, communicate, promote products, and interact beyond geographic and social boundaries. They are built on the principle of two-way communication, where users actively exchange content and ideas. Often referred to as Web 2.0 technologies, social media facilitates dynamic interaction by allowing people to share personal content and media, fostering ongoing collaboration and participation. Social media platforms have become essential spaces for global interaction, enabling users to connect with individuals from all corners of the world.

Ghermandi et al., (2023) noted that more than half of the global population actively uses social media, creating an unprecedented flow of information that has transformed the study of human relationships with their environment. Researchers are increasingly leveraging this data to explore technological innovations and sustainable development solutions. This includes analyzing key areas like food production, water sourcing, and waste management, aiming to reduce pollution and promote environmental sustainability.

In the field of education, schools utilize social media to raise awareness among students and parents about the importance of environmental preservation. Platforms such as Facebook, WhatsApp, and Instagram are used to disseminate information, highlighting the negative impacts of unsustainable practices and encouraging more eco-friendly behaviors. For example, Ghermandi et al., (2023) emphasized the role of social media in educating the public about the degradation of natural resources, the consequences of improper waste disposal, and the importance of providing clean drinking water, particularly in developing nations. These platforms are proving to be powerful tools in driving environmental consciousness and promoting sustainable development on a global scale.

Cloud computing plays a vital role in promoting sustainable development by reducing carbon emissions, optimizing resource efficiency, enabling remote work, and fostering innovation. As an evolving concept, cloud computing allows organizations to access all their information technology needs via the Internet, offering a cost-effective solution for schools and institutions with limited budgets for IT infrastructure. It enables rapid deployment, development, and testing without the need for expensive hardware, making it an attractive option for young educational institutions.

Cloud computing operates on the principle of on-demand network access, facilitating collaboration and improving accessibility. It is defined by five essential characteristics, supported by three

service models, and organized into a theoretical classification system (Biswas, 2015). The three primary models of cloud computing are public, private, and hybrid clouds, each offering different levels of accessibility and control depending on organizational needs. These models enable institutions to select the most appropriate infrastructure, balancing security, scalability, and cost-efficiency, ultimately contributing to sustainable technology practices.

Statement of the Problem

Despite the recognition of technological innovation as a crucial driver of sustainable development, secondary schools in Kwara State encounter significant challenges in integrating these innovations into their curriculum and practices. This has resulted in students being inadequately prepared to contribute effectively to sustainable development within their communities and the state at large. Pressing issues, such as food shortages that have driven up food prices, negatively impact students' ability to concentrate and learn. Additionally, improper waste disposal methods and a lack of access to clean drinking water continue to present major societal and environmental problems.

Adedigba (2019) conducted a study on sustainable development in Kwara, identifying a gap between policy formulation and action, which has hindered progress toward achieving sustainable development goals. Similarly, the Organization for Economic Co-operation and Development (OECD) in 2011 noted that the necessary processes for achieving sustainable development have not yet been fully implemented. This study explores how technological innovation in secondary schools can promote sustainable development in Kwara State, equipping students to tackle sustainability challenges locally and globally.

Purpose of the Study

The main purpose of the study was to examine technological innovation in secondary schools as a tool for sustainable development. Other purposes sought to find out: the state of:

1. virtual reality and sustainable development in Kwara State secondary schools.
2. social media and sustainable development in Kwara State secondary schools.
3. cloud computing and sustainable development in Kwara State secondary schools.
4. sustainable development in Kwara State secondary schools.
5. technological innovation in Kwara State secondary schools

Research Questions

The following research questions have guided the study.

1. What is the level of virtual reality in Kwara State secondary schools?
2. What is the level of social media in Kwara State secondary schools?
3. What is the level of cloud computing in Kwara State secondary schools?
4. What is the level of sustainable development in Kwara State secondary schools?
5. What is the level of technological innovation in secondary schools in Kwara State?

Research Hypotheses

The following research hypotheses were formulated and tested at 0.05 level of significance:

Ho_1: There is no significant relationship between virtual reality and sustainable development in Kwara State.

Ho_2: There is no significant relationship between social media and sustainable development in Kwara State

Ho_3: There is no significant relationship between cloud computing and sustainable development in Kwara State

Ho_4: There is no significant relationship between cloud computing and sustainable development in Kwara State

Ho_5: There is no significant relationship between technological innovation and sustainable development in Kwara State

Methodology

The study is a descriptive survey design of the correlational type. The population consisted of 26 senior secondary school teachers in Kwara State, which was estimated at 2,126 (National Bureau of Statistics, 2022). Following the Research Advisor's (2006) Sample Size Table, for a population of 2,126, a sample of 322 is recommended at 95% and 5.0 margin of error. Thus, 291 respondents were randomly selected across various senior secondary schools in Kwara State. The schools were purposefully selected in the three senatorial districts of the state to represent the peculiarities of each region of the state. The instrument was an adapted structured questionnaire titled 'Technological Innovation and Sustainable Development Questionnaire' (TISDQ). The validity and reliability of the instrument were assessed using Cronbach's alpha, and the reliability coefficient was 0.71. The instrument was administered to the respondents by the researcher. The collected instrument was analyzed with descriptive statistics of mean, median, and standard deviation. The hypotheses were tested using inferential statistics of the Partial Square Structural Equation Model (PSSEM).

Results

Hypothetical Models

Research Question 1: What is the level of virtual reality in secondary schools in Kwara State LGA?

Descriptive statistics for all construct items were calculated using the median, given the ordinal nature of the dataset. The analysis utilized a four-point Likert response scale ranging from strongly disagree (1) to strongly agree (4) for measuring each item. Ordinal data analysis necessitates a distinct set of methods compared to other quantitative variables. These methods consider the inherent ordering of variables to prevent a loss of statistical power (Agresti, 2010; Ayanwale, 2023). It is crucial to note that calculating a mean or standard deviation for ordinal data is statistically challenging and discouraged. Instead, alternative measures such as median, mode, or quartile are recommended (Agresti, 2010). The descriptive statistics, represented by the median, were computed for each item of the construct. Table 1 illustrates the descriptive statistics for virtual

reality. For convenient scale interpretation, respondents' Likert scale responses were categorized into two groups: 1-2.49 as low and 2.5–4.0 as high.

Table 1: Descriptive statistics for the level of virtual reality

Statement	Median	Level
The virtual reality is fascinating for students	3.000	High
They forget everything around them	3.000	High
At times they are frustrated	3.000	High
It is a challenge to them sometimes	3.000	High
Various techniques in the navigation techniques are well integrated	3.000	High

Table 1 outlines the descriptive statistics pertaining to the level of virtual reality in secondary schools within Ilorin West LGA. The focus is on statements related to virtual reality, with median values consistently indicating a high level across various items. The consistent median value of 3.000 across all statements indicates a high level of agreement among respondents regarding the positive impact of technological innovation on students. This suggests a generally favourable perception of virtual reality in terms of its impressiveness and potential for students' engagement. While the high level is encouraging, the acknowledgement of occasional challenges and frustrations highlight areas for improvement. For educators and policy-makers in secondary schools in Ilorin West LGA, these findings imply an overall positive attitude toward the integration of virtual reality in education. Addressing challenges and frustrations can further enhance the effective implementation of technological innovations in the educational setting.

Research Question 2: What is the level of cloud computing in Kwara State secondary schools?

Table 2: Descriptive statistics for the level of cloud computing

Statement	Median	Level
I am aware of cloud computing	3.000	High
I understand how it works	3.000	High
Cloud computing is beneficial for sustainable development	3.000	High
Cloud computing is used to promote good sources of water provision	3.000	High
Cloud computing is used to encourage proper waste disposal	3.000	High

Table 2 provides an overview of the descriptive statistics for the level of cloud computing in secondary schools within Kwara State. The analysis focuses on several statements, and consistently, the median values reflect a high level across various items. Consistently high median values across all statements indicate a strong consensus among respondents in terms of their awareness, understanding, and positive perception of cloud computing. This suggests that individuals in secondary schools in Kwara State are well-versed in cloud computing, comprehend its functionalities, and recognize its potential benefits, especially in the context of sustainable development and specific applications like water provision and waste disposal. For educators and

policy-makers, these findings suggest a favourable attitude toward the integration of cloud computing in secondary education, highlighting the readiness of respondents to embrace its various applications.

Research question 3: What is the level of social media in Kwara State secondary schools**?**

Table 3: Descriptive statistics for the level of social media

Statement	Median	Level
I am a member of a social networking sites	4.000	High
I use both WhatsApp and Facebook	4.000	High
I have read about sustainable development on social media	3.000	High
I use social media to promote sustainable development (water, waste and food provision)	3.000	High
I encourage students to protect the environment	3.000	High

Table 3 provides an insight into the descriptive statistics for the level of social media engagement in secondary schools within Ilorin West LGA. The analysis focuses on various statements, consistently revealing a high level of involvement and utilization of social media platforms. Consistently high median values, especially with statements related to social media usage and membership in social networking sites, indicate a substantial level of engagement among respondents. This suggests active participation in platforms like WhatsApp and Facebook, utilizing them for various purposes, including the promotion of sustainable development. While the median value for reading about sustainable development on social media is slightly lower (3.000), it still implies a generally high level of awareness and information consumption. Overall, the findings suggest that social media plays a significant role in disseminating information about sustainable development, offering a potential platform for promoting environmental awareness and protection among students in secondary schools within Ilorin West LGA.

Research question 4: What is the level of sustainable development Kwara State secondary schools?

Table 4: Descriptive statistics for the level of sustainable development

Statement	Median	Level
Providing good water consumption is necessary	4.000	High
Preserving nature is necessary for sustainable development	4.000	High
Sustainable development requires that humans reduce all sorts of wastes	3.000	High
Water wastage assists sustainable development	3.000	High
Recycling of waste affects sustainable development	3.000	High
People have gardens to reduce food shortage	3.000	High
Water wastage is good for sustainable development	3.000	High
Use of more of nature's resources than we need does not threaten sustainable development	3.000	High

Table 4 furnishes descriptive statistics illuminating the level of sustainable development in secondary schools within Kwara State, addressing various statements. The consistent median values across different statements indicate a high level of understanding and commitment to sustainable development. The consistent median values of 4.000 for statements emphasizing the necessity of good water consumption and preserving nature showcase a high level of recognition among respondents regarding these fundamental aspects of sustainable development. While the median values for statements related to waste reduction and recycling are slightly lower (3.000), they still signify a generally high commitment to sustainable practices. The findings indicate a positive attitude and awareness of sustainable development principles among students in secondary schools in Kwara State. Integrating these principles into educational programs may further enhance environmental consciousness and encourage responsible behaviours among students.

Research Question 5: What is the level of technological innovation in Kwara State secondary schools?

Table 5: Descriptive statistics for the level of technological innovation

Statement	Median	Level
Technological innovation is well-known among staff and students	3.000	High
Virtual reality is used for sustainable development	3.000	High
Social media is a tool for sustainable development	3.000	High
Cloud computing is used by schools	3.000	High
Technological innovation is germane to sustainable development	3.000	High

Table 5 provides descriptive statistics highlighting the level of technological innovation in secondary schools within Ilorin West LGA, focusing on various statements. The consistent median values of 3.000 across different aspects indicate a high level of familiarity with and recognition of technological innovations. The consistent median value of 3.000 across statements related to technological innovation indicates a high level of familiarity and recognition among respondents, encompassing both staff and students. This high level suggests that technological innovation,

encompassing virtual reality, social media, and cloud computing, is widely acknowledged as instrumental in promoting sustainable development within secondary schools in Ilorin West LGA. The findings imply a positive attitude toward the integration of technological advancements into educational practices for the advancement of sustainable development. Schools in the region appear to actively embrace and employ various technological innovations, such as virtual reality, social media, and cloud computing, to enrich the learning environment and contribute to the attainment of sustainable development goals.

Additionally, Partial Least Squares Structural Equation Modeling (PLS-SEM), a methodology endorsed by recent studies (Ayanwale et al., 2022; Hair et al., 2020) was used for the data analysis. This multivariate analysis technique was chosen for its ability to estimate theoretically established relationships between cause and effect (Shah et al., 2022). SmartPLS software version 4 (Christian et al., 2023) was utilized to test the measurement and structural models. The first step involved evaluating the measurement model to ensure it met recommended quality cut-offs for internal consistency (Cronbach's alpha and composite reliability), convergent validity (outer loading and average variance extracted (AVE)), and discriminant validity (heterotrait-monotrait-ratio of correlation) across the variables. In the second step, the structural models were scrutinized to assess the hypothesis that variables are interrelated, employing bootstrapping with 10,000 re-samples to determine the significance of the path coefficient ($p < 0.05$).

Measurement model assessment

The evaluation of hypothesis validity and reliability is conducted based on the measurement model before hypothesis testing. Sarstedt et al. (2021) recommend assessing indicator reliability through their respective factor loadings on the underlying construct. They argue that an item is considered reliable if its factor loading is greater than the standard of 0.70, but a loading of 0.50 is also deemed acceptable. Referring to Table 6 and Figure 1, it is observed that all outer loadings remain above 0.50 even when excluding ten items (cloud1 = 0.225, cloud2 = 0.148, cloud3 = 0.368, soc4 = 0.152, sus1 = 0.277, sus2 = 0.325, sus3 = 0.172, sus4 = 0.436, vir3 = 0.193, and vir4 = 0.313) that fall below this threshold value (Sarstedt et al., 2021). Table 6 also presents Variance Inflation Factors (VIF) for the analyzed variables, employed to assess the presence of multicollinearity in the study. According to Hair et al. (2011), a VIF value lower than 5 is considered significant, indicating the absence of potential multicollinearity concerns. Therefore, the VIF values suggest that there is no significant issue with multicollinearity in the study.

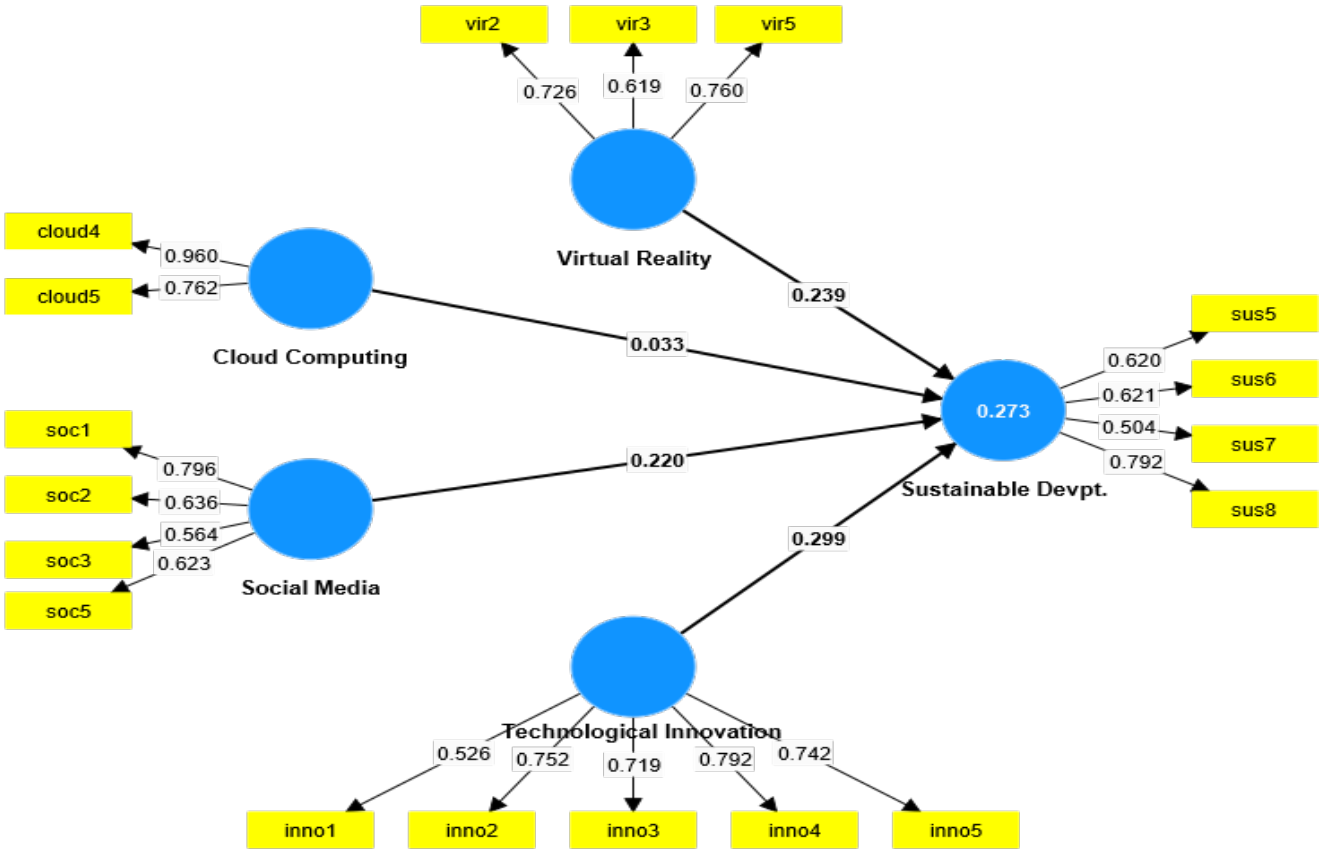

Figure 1: Measurement model for the factor loadings

Table 6: Item loadings

Indicators	Statements	Cloud Computing	Technological Innovation	Social media	Sustainable Devpt.	Virtual Reality	VIF
cloud4	Cloud computing is used to promote good sources of water provision	0.960					1.435
cloud5	Cloud computing is used to encourage proper waste disposal	0.762					1.435
inno1	Technological innovation is well-known among staff and students		0.526				1.171
inno2	Virtual reality is used for sustainable development		0.752				1.415

inno3	Social media is a tool for sustainable development		0.719				1.557
inno4	Cloud computing is used by schools		0.792				1.612
inno5	Technological innovation is germane to sustainable development		0.742				1.715
soc1	I am a member of a social networking sites			0.796			1.193
soc2	I use both WhatsApp and Facebook			0.636			1.240
soc3	I have read about sustainable development on social media			0.564			1.183
soc5	I encourage students to protect the environment			0.623			1.126
sus5	Recycling of waste affects sustainable development				0.620		1.143
sus6	People have gardens to reduce food shortage				0.621		1.116
sus7	Water wastage is good for sustainable development				0.504		1.133
sus8	Use of more of nature's resources than we need does not threaten sustainable development				0.792		1.155
vir2	They forget everything around them					0.726	1.170
vir3	At times they are frustrated					0.619	1.127
vir5	Various techniques in the navigation techniques are well integrated					0.760	1.083

Additionally, Ayanwale et al. (2023) and Hair et al. (2017) proposed a minimum threshold of 0.40 for the estimated average variance extracted (AVE), considering 0.50 as substantial. The AVE generated by the measurement model surpasses the benchmark value of 0.40, making it acceptable for the current analysis (refer to Table 7). Moreover, a construct is deemed reliable when the reliability coefficient for the predictive model is 0.6 or above. Both the composite reliability values (following Hair et al., 2020) and Cronbach's alpha values (according to Hair et al., 2013) exceed the recommended 0.60 level, establishing internal consistency reliability (see Table 7).

Table 7: Reliability and validity of the construct

Constructs	Cronbach's alpha	Composite reliability (rho_c)	AVE
Cloud Computing	0.710	0.856	0.751
Social media	0.691	0.753	0.436
Sustainable Devpt.	0.648	0.733	0.413
Technological Innovation	0.753	0.835	0.507
Virtual Reality	0.603	0.746	0.496

Furthermore, the evaluation of divergence validity incorporated the use of the heterotrait-monotrait ratio of correlation (HTMT). This method addresses limitations in the preceding steps and aims for a correlation coefficient below 0.85, as recommended by Oluwadamilare & Ayanwale (2021) and Henseler et al. (2015). As detailed in Table 8, all HTMT values fall below the specified threshold of 0.85. Consequently, the measurement model remains free from divergent validity concerns even after the exclusion of ten items. In conclusion, the identified constructs and indicators from the evaluation process are deemed appropriate for hypothesis testing and model assessment.

Table 8: Discriminant validity – HTMT

Constructs	Cloud Computing	Social media	Sustainable Devpt.	Technological Innovation	Virtual Reality
Cloud Computing					
Social media	0.203				
Sustainable Devpt.	0.251	0.520			
Technological Innovation	0.470	0.412	0.523		
Virtual Reality	0.131	0.373	0.571	0.272	

Structural Model Assessment

Following the analysis of the structural model, the next phase involved evaluating the model's predictive accuracy through the examination of the coefficient of determination (R^2 value). The proposed model, encompassing technological innovation, cloud computing, virtual reality, and social media, demonstrated the ability to account for 27.3% of the observed variance in sustainable

development. This suggests a moderate level of predictive accuracy (Ayanwale et al., 2023; Hair et al., 2017). Additionally, the significance of path coefficients was assessed by testing hypotheses through a bootstrapping procedure with 95% bias-corrected confidence intervals. This involved utilizing 10,000 samples and excluding sign-change options to ensure robust statistical testing.

Table 8: Summary of path coefficient

Hypotheses	Relationship	Original sample	Sample mean	STD	T	p-values
H1	Technological Innovation -> Sustainable Development	0.299	0.299	0.079	3.794	0.000
H2	Social media -> Sustainable Devpt.	0.220	0.223	0.059	3.740	0.000
H3	Virtual Reality -> Sustainable Devpt.	0.239	0.249	0.056	4.311	0.000
H4	Cloud Computing -> Sustainable Devpt.	0.033	0.043	0.055	0.602	0.274

Table 8 and Figure 2 present the results of the structural model analysis revealing significant insights into the relationships between different factors and their impact on sustainable development. The positive and statistically significant path coefficient (T-statistic = 3.794, P-value < 0.05) suggests that technological innovation plays a crucial role in enhancing sustainable development. As technological innovation increases, there is a corresponding improvement in sustainable development. Also, a positive and statistically significant path coefficient (T-statistic = 3.740, P-value < 0.05) indicates a substantial positive association between social media and sustainable development. The findings suggest that an increase in social media usage is linked to improvements in sustainable development. With a positive and statistically significant path coefficient (T-statistic = 4.311, P-value < 0.05), the results highlight the positive impact of virtual reality on sustainable development. An increase in virtual reality adoption is associated with advancements in sustainable development. Although the path coefficient for cloud computing is positive, it is not statistically significant (T-statistic = 0.602, P-value > 0.05). This suggests that, in the context of the study, the relationship between cloud computing and sustainable development may not be substantial. The findings underscore the importance of prioritizing technological innovation, leveraging social media, and integrating virtual reality to drive sustainable development initiatives. However, it is crucial to note that, in the specific context of the study, cloud computing may not significantly contribute to sustainable development. Policy-makers and practitioners can use these insights to inform strategies for promoting sustainability through targeted technological interventions.

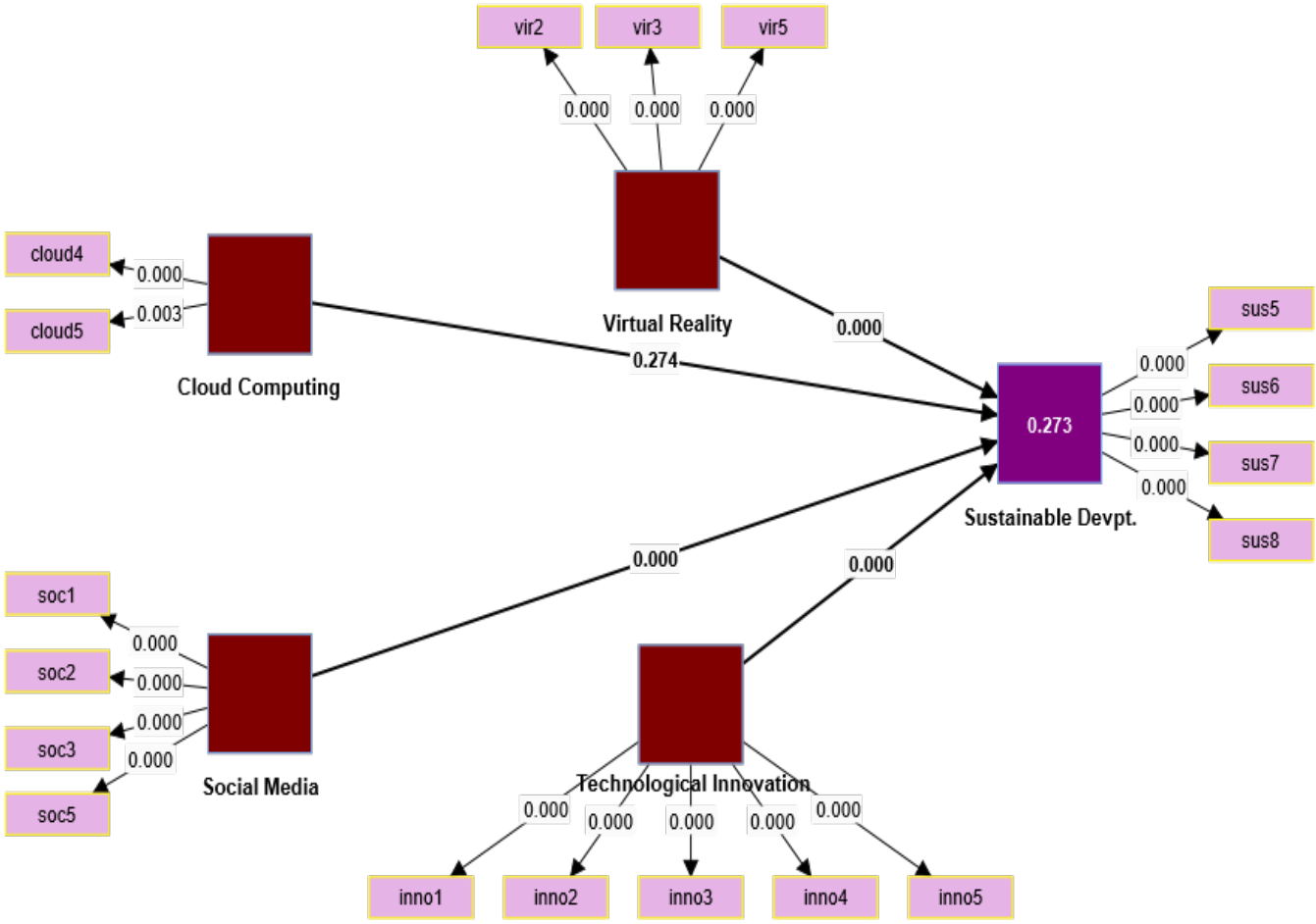

Figure 2: Structural model

Furthermore, a thorough evaluation of the model's predictive accuracy was conducted by the researchers, assessing both the indicator level and the composite score level, as recommended by Sanusi et al. (2024) and Danks et al. (2017). This comprehensive approach allowed the researchers to gain insights into the overall predictive power of the model. In assessing predictive performance, various statistics such as mean absolute error (MAE) and root mean squared error (RMSE) were considered. While RMSE is commonly used for this purpose, the analysis also considered the distribution of prediction errors. To gauge the model's performance, we compared RMSE (or MAE) values for each indicator with those of a naive linear regression model (LM) benchmark. This comparative analysis served as a key determinant of our model's predictive capabilities. Specifically, if all indicators in the PLS-SEM analysis exhibited lower RMSE (or MAE) values compared to the LM benchmark, it indicated a high level of predictive power. A scenario where most indicators in the PLS-SEM analysis showed lower RMSE (or MAE) values suggested a medium level of predictive power.

Table 9: Summary of PLS prediction result

Indicators	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
sus5	0.053	0.812	0.614	0.802	0.607
sus6	0.077	0.789	0.639	0.781	0.623
sus7	-0.001	0.891	0.696	0.866	0.701
sus8	0.198	0.807	0.632	0.800	0.621
	Q^2predict	RMSE	MAE		
Sustainable Devpt.	0.220	0.889	0.703		

Conversely, if only a minority of indicators displayed lower prediction errors than the LM benchmark, the model's predictive power was considered low. In the absence of any indicators exhibiting lower prediction errors than the LM benchmark, it implied a lack of predictive power in the model. As a result, Table 9 provides a comprehensive summary of the PLS predict outcomes, focusing on key indicators such as Q^2predict, PLS-SEM_RMSE, PLS-SEM_MAE, LM_RMSE, and LM_MAE. The individual Q^2predict values illuminate the predictive significance of the model for each indicator, while the cumulative Q^2predict for sustainable development points towards a moderate level of predictive accuracy. The reduced RMSE and MAE values signify enhanced overall predictive capability. These findings highlight the varying degrees of predictive significance across different indicators, emphasizing the need for a nuanced understanding of the model's effectiveness for each variable.

Conclusion

In the epilogue, technical innovation in secondary schools has the potential to drive sustainable development in Kwara State by equipping students with the skills and knowledge necessary to address complex challenges. All the statements raised for virtual reality, social media, and cloud computing revealed the involvement of schools in the use of technological innovations. Therefore, the students are taught how to improve and preserve the environment for the next generation through the use of sustainable methods. Thus, proper waste disposal, provision of water, and food production are made known to the students and the community.

Recommendations

Based on the findings of the study the following recommendations were made:

1. Virtual reality in schools among students should be maintained for greater improvement of sustainable development in Kwara State.
2. The use of social media platforms to educate people about the dangers of improper waste disposal should be on the rise.
3. Schools should continue to embrace the use of cloud computing to manage and promote information sharing about sustainable development.

4. Sustainable development should be advocated for among students in order to ensure the safety of the upcoming generation.
5. Technological innovations should be encouraged to improve sustainable development in Kwara State
6. Government should use her political will to promote policies which support waste management through the means of technological innovation aimed at sustainable development.

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INDISCIPLINE IN SENIOR HIGH SCHOOLS IN GHANA

Cosmos Kwame Dzikunu
Centre for Educational Policy Studies
University of Education, Winneba

Andrews Acquah
National Centre for Research into Basic Education
University of Education, Winneba

Daniel Yelkpieri,
Centre for Educational Policy Studies
University of Education, Winneba

Edison D. Pajibo,
Centre for Educational Policy Studies
University of Education, Winneba

ABSTRACT

The study investigated causes and influence of indiscipline in secondary schools in Ghana. A multi-site case study from a population of students, teachers, headmasters, headmistresses, assistance heads, senior housemasters and mistresses and parents was adopted. A sample size of 56 participants, comprising 10 school prefects, 10 non prefects, 5 house staff and 15 parents were engaged in a focus group discussion. In addition, 8 headmaster/mistresses, and 8 senior housemasters/ mistresses were interviewed. The data analysis method used was thematic. The study which is in its first phase, was conducted in Southern Ghana. The study revealed three key causes of school indiscipline, namely, attitude of parents over protecting their wards even when school rules were flouted, the interpretation the media ascribed to indiscipline and the removal of corporal punishment from disciplinary actions. The study also revealed that indiscipline lowered the authorities of school leaders and teachers and led to a declined in students' academic performance. The study therefore recommended an alternative disciplinary regime which should include sanctions to be collectively agreed upon by student unions, civil society organizations, law enforcement officers, educational institutions, parents and religious bodies.

Introduction and Study Context

Over the past decade, there has been increasing spate of indiscipline in Ghana. Standards of behaviour, attitudes, norms, and values in society have changed over the past decade, especially among the youth (Chimhenga, 2017). Thoughts, attitudes and norms of young learners are continuously evolving and changing negatively. Particularly, in senior high schools, there have been reports of students' negative behavioural issues. Indeed, the issue of students' behavioural problems remains a challenge for many parents, social workers, teachers, educationists and significant others who are concerned with the education of the youth. Indiscipline affects teaching and learning, so it cannot be ignored by well-meaning stakeholders in education. It is important that educational leaders understand the effect of such behaviours and provide policy direction for national education development (Chimhenga, 2017; Asiedu-Yirenkyi, 2019).

In classroom learning situations, some learners have lost respect for their teachers and disturbed the learning activities by making unnecessary noise and bullying fellow learners (Chimhenga, 2017). Ngwokabuenui (2015) observed that these students cultivate and demonstrate deviant behaviours and may not fulfill their potentials. As a result there is an outcry of Cameroonian educators, administrators and parents about the increasing rate of indiscipline in Cameroonian secondary schools. Some young people have resorted to delinquency and drug abuse. These changes are common in most societies, including Ghana. Such changes affect attitudes of young and old people. Chimhenga (2017) argues that the norms and values within the society are changing, and these changes affect upbringing of children. This trend of indiscipline among young people "unsettles the mind of patriotic Cameroonians since children are considered the future leaders of the country" (Ngwokabuenui, 2015, p.64)

There have been countless number of incidences in schools where students have threatened teachers, molested them, and abused them for example, there has been a case of female students in school uniforms sighted for indecent behaviours on school compound in Ghana, and even threatening teachers. Again, there was a social media report of some female students raining insults on government official of the country, (Asare-Donkoh, 2018). In another instance, Ghanaians were horrified to hear a case of indiscipline from groups of senior high school (SHS) examination candidates who stated that because the first paper they wrote, *Integrated Science,* was too difficult for them, they carried out riot, vandalism, and insulted authorities. Some of these SHS students attacked and assaulted journalists, teachers who invigilated them, heads of school, and other West African Examination Council (WAEC) officials. This is quite disturbing as a nation. It must be emphasized that these acts of indiscipline among students have become a national concern (https://www.graphic.com.gh/news/general-news/wassce-bright-shs-students-beat-invigilator-graphic-reporter).

The Ghana Education Service and the Ministry of Education, in conjunction with other stakeholders such as the Ghana National Association of Teachers (GNAT), and National Association of Graduate Teachers (NAGRAT) have developed rules and regulations, and measures such as institutionalizing the Guidance and Counselling Unit in SHS to curb the menace of indiscipline in SHSs in Ghana. Yet, indiscipline persists in SHSs. Predicated on the unabated occurrences of indiscipline, especially in SHSs, despite efforts at the institutional and national levels, the literature (Amoah, et al., 2015) gives indication that an in-depth inquiry to gauge the experiences of key stakeholders (school administrators, teachers, parents, students and significant others) is needed. Therefore, this study sets out to investigate the causal factors accounting for indiscipline in senior high schools. These issues provided the *raison d'être* for the study.

Purpose and Objectives

The study intended to bring the issues of student indiscipline to the fore of national discussions sthrough disseminating the findings from this research with the aim of providing direction for a national policy on discipline in schools, a policy that will be relevant in keeping the Ghanaian social order.

The following objectives were formulated to guide the study:

a. To Identify the causes and effects of students' indiscipline in secondary schools in Ghana:
    a. School-based factors that cause indiscipline at the secondary schools.

b. Societal-based factors that cause indiscipline in the secondary schools.

b. To establish the influence of school indiscipline on nation building in Ghana.

c. To evolve alternative policy direction and measures to curb school indiscipline in SHSs in Ghana.

Methodology

Qualitative research approach, utilising the multi-site case study design was employed. The population comprised of students, teachers, headmasters/mistresses and assistants, senior house masters, house masters and mistresses, and parents. The sample frame covered students, teachers, headmasters and assistants, senior house masters, house masters and mistresses and parents The sample included 40 participants who were interviewed. In addition, 10 school prefects, 10 non-prefects, 5 house staff and 5 parents were engaged in a focus group discussion. A pilot testing was conducted at the Winneba Senior High School which was not included in the study sample. The aim of the pilot testing was to identify any ambiguities in the questions and to fine tune the items. In addition, to ensure trustworthiness of the question items, member checking was used to determine accuracy of the instruments (Creswell, 2009; Amoah et al., 2015).

The data analysis method used was thematic. To ensure anonymity, the respondents were identified with codes per the category (e.g. School head (HM), assistant head academic (AHA), assistant domestic (AHD), prefects (Prefects), non-prefects (non-Prefects, school counsellors (GCC) etc). Under the first research objective, to identify the causes of school indiscipline among SHS students in Ghana, the themes identified were school based factors which included rushed policies (e.g. abolishment of corporal punishment), students capitalising on child rights/codes of conduct thus, neglecting the responsibility factor, peer pressure, misbehaviour of new teachers due to indiscipline imbibed from their alma mater and teachers' limited knowledge of child rights/code of conduct. The themes identified under the societal-based factors included problem with media/child rights activist groups' negative parental influence.

The second research objective (to establish the effects of school indiscipline in Senior High Schools in Ghana) the themes identified included, loss of teacher authority, poor academic performance, irresponsible future leadership, increase rate of social vices, danger to national peace and development, and social/ physical attacks on teachers.

The third research objective identification of alternative measures to curb school indiscipline in Ghana, themes such as strong but regulated sanctions, sensitization through the media, media restrictions, education through the religious bodies, motivating teachers/encouraging teacher discipline, reinstitution of the Parent Association regime, and review of GES discipline codes.

FINDINGS

Objective One: To identify causes of school indiscipline among SHS students in Ghana.

Theme One: School-Based Factors

Although there are myriads of causes accounting for indiscipline in schools, especially at the SHS level, school-based factors were major theme identified. (Asiedu-Yirenkyi, 2019). Participants, who included Assistant Headmaster, House staff, school-prefects and non-school prefects, provided responses during fieldwork. Out of the school-based factors, two sub themes emerged, abolishment of corporal punishment and teacher misbehaviour

Sub theme one: The Abolishment of Corporal Punishment in school

In relation to the abolishment of corporal punishment in schools, an assistant head for academic affairs observed:

> *I will say that in a way the abolishment of corporal punishment has not totally helped… we are used to being disciplined by the cane for many years. Taking out the cane and other corporal punishment made people do not really care especially in these days of human rights* (AHA#2).

Another assistant head for domestic activities remarked:

> *In fact, with the abolishment of corporal punishment students have become untouchable as if they were kings and queens, and because of that it has promoted indiscipline to the highest level. Some of the children know that because of this child right thing, they are not to be given corporal punishment. And so, because of this, the children take the law into their own hands. They come to school late and disrespect teachers* (AHD# 2).

In addition to the interview, participants (non-prefects) were involved in a focus group. Excerpts:

- The President of Ghana says you cannot cane me, so I have the right to report if you cane me.
- One thing we need to do is to show evidence or mark of caning on the body.
- The nation itself is derailing on indiscipline especially people in authority. This is reflected in our schools.
- The removal of caning has made indiscipline very high.

In another focus group session, participants (Prefects) voiced out the following sentiments (excerpts):

- Lashing is no more, so we have indiscipline very high.
- Regarding societal factors, indiscipline is so widespread that years to come, you cannot even talk about your own children without someone or a child telling you I will arrest you.
- Indiscipline in our secondary schools is based on this domestic violence thing. Before a person becomes a mom or a woman, she thinks it is normal to beat another person.
- The children are taking advantage of the fact that we cannot cane them. They know that all we can do is to talk.

The data reveal that with the introduction and abolishment of corporal punishment in schools students are free to behave the way they deem fit regardless of the rules and regulations of the schools. Students feel that they cannot be punished because they are protected by the Child's Rights Act. This has given students the freedom to misbehave in schools and also take the law into their own hands. This state of affairs has promoted high indiscipline in secondary schools in Ghana. This finding corroborate the view of Ngwokabuenui (2015, p. 65) who observed that "students have become uncontrollable and highly disrespectful to; teachers, school administrators, parents and the society at large".

Sub-theme Two; Increasing enrollment without corresponding facilities in dormitories and classrooms

During an interview session a Guidance and Counselling Coordinator had this to say,

> *Student numbers are very high and makes discipline difficult. The intake is too much as compared to the number of teachers in the school. Most of our students get frustrated with the food they are offered; girls are breaking bounds because conditions in the dormitories are terrible* (GCC# 5).

Again, a Senior House staff commented thus,

> *We are over recruiting students, but our facilities remain the same over the years. Classrooms are clouded with large numbers being admitted. Our dormitories are worse. These residential facilities were built to accommodate certain number of students but now we have exceeded and overflowing. These conditions give vent to student misbehaviour such as stealing items from their friends, wanting to go and sleep at their boy friends' place, which is more comfortable, and joining gangs in town* (SNH#3)

Narratives from both the interviews and the focus group discussions signified the out-rushed abolition of corporal punishment and students capitalizing on child's right/code as the key cause of student indiscipline in Senior High Schools. The debate relating to the removal of corporal punishment or the arguments regarding its reintroduction will linger on for a long time to come. What is not in doubt, however, is that in Ghana, there is a great concern at the moment relating to what is seen as the collapse of moral values at personal, community and national levels, and this has transcended into schools. The state of school facilities relating to the classrooms and dormitories is critical to stemming student indiscipline. If conditions in the dormitories is deplorable it may promote truancy among students. Cases of students breaking bounds, running to town and others must be a matter of concern to stakeholders. It is recommended that the government of Cameroon, policy makers, education reformers, and school administrators should ensure that schools are provided with adequate facilities for teaching and learning, sports and games as well as information communication technologies and internet connectivity (Blandina and Leonce, 2021; Asiyai, 2005; & Ngwokabuenui, 2015). A second strand to the argument is what Chimhenga (2017) refers to as the battle to control the child. This battle is pitched among four actors: the child, the school, the parents and human rights groups. Each of these constituents has a different perception about how the child is to be brought under control as it relates to moral standards. Implicitly, unless there is a common understanding regarding how a child is to be groomed as a responsible citizen of society, the canker of indiscipline especially in our Senior High Schools, will continue to persist. Bear (2008) posits that schools fail to recognise that behaviour correction is not a sufficient prerequisite for developing self-discipline. Effective establishment and maintenance of safety and order in schools and other institutions do not always translate into the development of self-discipline or the avoidance of future behavioural issues. According to the author, the main methods for controlling behaviour are consistent incentives, unambiguous guidelines and expectations, and penalties for bad behaviours. This position sits well with Aguba (2009) who maintained that discipline is externally induced in individuals who do not succumb to established rules and regulations out of personal volition but out of fear of punishment or sanctions.

Sub Theme Two: Misbehaviour of teachers

Also, generated from the field as school-based factor accounting for indiscipline in senior high schools was misbehaviour of teachers.

In a focus group discussion, participants (prefects) opined-(excerpts):

- The current teachers are so indiscipline as their students. It is the same indiscipline teachers taught that are coming back to as teachers.
- Some teachers are befriending girls, having sex everywhere and the boys are befriending the same girls.

By far, from the data misbehaviour among teachers constitutes the worst form of school-based factors accounting for indiscipline among senior high school students in Ghana. As Aguba (2019) puts it, "it is the watch man letting loose his guard". This finds support in the argument that teachers' lateness and absenteeism, overcrowded classrooms, unconducive school environment, harsh school rules and regulations, poor teaching by some teachers and poor leadership of some school administrators could lead to students' indiscipline in schools (Gambo & Muktar, 2017; & Ngwokabuenui, 2015). This suggest that teachers, including head teachers, or headmasters should promote self-discipline and set good examples by maintaining professional standards, coming to school regularly, and punctually, and well dressed, checking on students' work, avoiding misappropriation of money and generally adopting standards of acceptable behaviours and defined social distance.

Sub Theme Three: Peer Influence among students

For example, during an interview session, a participant iterated that,

> *the students are going through peer pressure. They do what is said to them by their peers (GCC#3).*

Another Guidance and Counselling Coordinator observed that,

> *Some of these bad students recruits others or their colleagues and trained them, and this leads to high rate of social vices among students in the school (GCC#7).*

Assistant Head Domestic noted that,

> *Some students come to school and new nothing about drugs but are later influenced by their colleague to practice drugs. It is worrying (AHD# 6)*

The suggests that some students' indiscipline behaviour may be attributed to peer-influence that emanate from the school environment. Some students are able to influence their colleagues to adopt anti-social life styles such drug abuse, crime and breaking bounds from school. This is acknowledged by Ngwokabuenui (2015) and Reid (2000) who observed that student-student relationships influence students' indiscipline as a result of unpleasant and unsustainable environment in which students' needs are difficult to meet.

Theme Two: Societal- based Factors

It is often said that man is a product of societal forces, meaning that the society can make or break him (Slee, 1995). Apart from societal setbacks such as bad habits, low self-esteem, lack of parental counselling and influence of broken homes, parental poverty and pampering. There are other serious societal factors such as media/child rights and conflicts with activist groups that also account for indiscipline in SHSs.

Sub Theme one: Media Blame Game on Teachers

These were commented on by participants as follows:

The media is so fixative on the teacher, the teacher has done this; the teacher has done that. No teacher wants his name to be carried on airwaves as if he is doing something wrong. So, it is like teachers are being too careful (AHA#2).

During the interaction sessions, a Guidance and Counselling Coordinator observed that,

The current talk shows and phone in programs on the airwaves give room for insult, fighting in the studios, name calling for political opponents and many more are listened to by our youth, and some student results to the use of vulgar language against the very teacher who are teaching them and public officials. The negative reportage in the media landscape should be minimised (SNH#1)

The data implies that the social media play an influential role in students' indiscipline in our secondary schools. Some of the social media operators are not professionals in their reportage and therefore report incidents without cross checking the facts on the ground. In recent times, the social media has become so much focused on school administrators and teachers to the extent that the incident is blown out of proportion without proper investigation. As a result of this teachers are also being careful in how they handle students' disciplinary issues in schools. Aside that people use the airwaves to abuse and attack people during phone in which also influence the youth negatively in their training and up-bringing at school and at home. This finding corroborates with Abdulhmid and Yaduma (2007) who observed that the dynamic explosion of the mass media through the television, magazines and computer have contributed to the inculcation of deviant behaviours among students in Cameroon.

Sub Theme Two: Parental Influence

In a focus group interaction, participants (house staff) observed (excerpts):

- The parents are responsible for their wards and their discipline
- Some parents instill bad habits in their children, they pamper them and those from broken homes passed on their bad experiences to their children.

Analytically, judging from the data there is increasing recognition of the role of society as regarding indiscipline in secondary schools. Here, two societal influences, the mass media and parents influence are singled out. Indeed, most indiscipline can be blamed on the mass media. For example, Curren (2014) describes the mass media (radio, television, books, magazines, newspapers, films, and all forms of pornographic contents) as fertile grounds for acts of indiscipline in schools. Curren's assertion is typical of the fact that the outcome of students' encounter with these media fuels indiscipline and even crime. While some radio and television contents stimulate the thinking of the youths in high school towards indecency, others whet their appetite for indiscipline adventures and impart knowledge of criminal techniques, violent behaviours and obscenity.

The same can be said of parents. Many parents often fail to instill discipline in their children. Students from such homes transfer this kind of indiscipline to schools. Lovett and Jordon (2019) reveal that some parents support their children even if the latter have made grievous mistakes, not realizing that by giving in to a child's will or demand makes him/her uncontrollable and a menace to society.

Objective Two: Influence of School Indiscipline

The effects of indiscipline in schools take various dimensions and has repercussions on students and the society. The following effects or themes emerged from the data:

Theme One: Lowering of teacher authority

The data show that teachers who are often referred to as parent surrogates in school have their authority lowered because of indiscipline in schools. Indiscipline in schools in recent times has become a headache for managers of schools and it is directly affecting schools, students and the social fibre of the communities. A participant noted that:

> *...the counselling department of the GES has come out with some rules and regulations as to how students should be handled in their schools. And I think most of this was carved out of the child rights. So, I think, yes, they have a lot of relations with how you do handle the students in class. Most of the teachers don't send their students out of class. I mean, when a teacher sends students out, the effect is that the teacher is seen as negative (***AHA#1)**

Another participant noted that:

> *There was an emergency meeting in my office. The case was taken to the police station. The teacher concerned beat a girl but no one supported the teacher and after that case no one was able to do anything. The girl insulted the teacher in the class and the case was seen as useless, but the teacher telling the girl that its break over became a case* **(AHD#2)**

Yet, another participant expressed that…

> *That is a very serious issue, if it continues. If I got your question right. It is very, very dangerous. Because now, if you go to our schools, it's not like before… students, hit a teacher. Because when a student hits a teacher, and the teacher retaliates or responds to what the student did, we might not look at it* **(GCC#1)**

The data seem to suggest that the GES' rules and regulations regarding how schools and teachers should handle students seem to have been carved out from the Child Rights document. Perhaps, this is in line with Article 28(2) which states that because of this, students are not punished by teachers in schools. Teachers who tried to correct students in class became victims and did not get even the support of the school. This situation has given students the courage to insult their teachers even in class. Conversely, data did not provide information regarding the measure the teacher used to correct the student in this case. However, Amoah, Owusu-Mensah, Laryea and Gyamera (2015, p.8) are of the opinion that teachers should employ "convenient and suitable disciplinary measures to ensure effective classroom management, and that giving support, it would build an effective teacher-student relationship".

Theme Two: Poor academic performance

Participants were of the view that indiscipline on the part of students affects academic performance and therefore attribute poor academic performance of students in recent times can be attributed to their indiscipline behaviours in schools. This observation was made from these responses as follows:

In relation to this, a participant said that…

> *So, what I mean is that indiscipline, let me take one aspect of indiscipline. Like students come to school late, and leaving school before time, you have to do eight hours in the school and you do three hours, or probably you don't come at all, at the end of the day, you are losing contact hours, you virtually learn nothing. So, if you don't come to school regularly, it is going to affect your performance (AHA#2)*

Another participant also had this to say.

> *Students are to stay in class, but since they are not staying in class they are not performing. They are not learning. Previously, students knew that if you are not in class for two days… A disciplined learner will organize his own life very well he knows the importance of being in class for every subject. Not selective subjects so it will improve their academic… it gives teachers room to get excuses, if teachers don't go to class, they will tell you because the students are not coming. …it is affecting how teachers even respond to their core duty as teachers so it will affect them academically* (AHD#2)

The responses seem to be unanimous that student indiscipline influence students' performance generally. Students who don't find time for their classes but choose to use class hours for other things end up reaping what they sow in the end. The data suggest that student indiscipline behaviours also affect teachers' attitude to work. Chimhenga (2017) observed that some learners have lost respect for their teachers, and this can disturb the learning activities by students making unnecessary noise and bullying fellow learners. This present finding agrees with the assertion that indiscipline in schools greatly affects the quality of teaching and learning, uncovered or unfinished school curriculum (Mariene, 2012; Munyasya, 2008; Onyango, 2008; Kabiru, 2007). As a result, some teachers use students' refusal to come to class and other misbehaviours as excuse to stay away from teaching, and at the end of the day the students suffer.

Amoah et al. (2015, p.10) argue that "discipline is necessary for effective management, especially if the goals of the schools are to be accomplished. To prevent and resolve students' discipline problems and ensure efficient functioning of schools, there must be reasonable disciplinary policies and procedures".

Theme Three: Irresponsible leadership in the future

Our society and schools are expected to train our youth to be disciplined and to become responsible leaders in various communities and the nation. Failure on the part of these stakeholders to do so can have serious consequences on national development as a result of irresponsible people leading the nation. On the issue of irresponsible leadership, the following reactions emerged from the data: A participant made this observation:

> *That is what I'm talking about. If they don't change, if we are not able to do anything to mould them, to correct them, and they go out they will go to universities and continue the same way. They will go to their workplaces with the same problem.* (GCC#3)

Another participant commented:

> *It would be very serious threat. Because you see any society anywhere you find yourself, is governed by rules and regulations. And if you don't want to operate within the confines of rules and regulations, then I wonder how you can fit in any society. And so if you have certain people who are not law-abiding, they will not have a good future. ... They will beat people around. They will steal and do things they want. And I don't think there will be peace in such an environment.* …(AHA#6)

The data seem to suggest that the current trend of indiscipline is not good because if students are allowed to continue to be lawless and ungovernable in schools and in societies, they will end up becoming liabilities to the nation. Therefore, steps must be taken to ensure that students are shaped in a way to become responsible in their actions. The situation calls a concerted effort of all stakeholders such as parents, teachers, non-governmental organisations, educational authorities, corporate bodies, past students and government to make conscious effort in finding a lasting solution to indiscipline in schools (Ngwokabuenui, 2015).

In a focus group discussion, the participants (House Staff #3) also made the following observations (excerpts):

- But the thing is that those in authority today come from the citizens. So, when we look at the students that we have now, they are the ones that are going to end up in those positions someday.
- If currently we are not able to imbibe in them the importance of being disciplined, then it means that some years to come those people that will be in authority that are supposed to manage our nation will be indiscipline.
- If we look at those in authority now, who we assume were actually disciplined and looking at how this country is being run and the way things are going, I don't even want to begin to imagine how things would be like if we put these current students in those positions.
- The absence of discipline is going to affect the country greatly.
- May be some 20, 30 years from now, but the scary part is that I don't think we are even going to last five years before we start seeing the adverse impact of this indiscipline among our students on the country.

The information gathered from the focus group discussion indicate dire consequences for the nation if this kind of indiscipline is not curbed. Presumably, it is the same indiscipline students we have today who are going to be our leaders tomorrow if nothing is done to check the trend. The data is suggesting some measures are taken now to forestall a situation where leadership in the country would be taken over by indiscipline youth in the future. It is in this respect that Ngwokabuenui (2015) is urging parent, school and religious bodies that are charged with moral training of children to ensure that sound moral education is giving to children, our future leaders. In this respect, it is expected school discipline should be guided by the underlying principle concerning school discipline. That is school authorities should administer discipline in a manner consistent with the child's dignity and in accordance with applicable international laws on the Rights of the Child. The convention of the Rights of the Child (CRC), Article 28(2) stipulates that state parties shall take all appropriate measure to ensure that school discipline is administered in a manner consistent with the child's human dignity and in conformity with the present convention.

Theme Four: Increase rate of social vices

There is no denying the fact that most often it is indiscipline students who end up being sacked from schools and join other drop-out youth on the streets. This group of youth are very desperate and try to find other ways of surviving for comfortable lives. On this issue, a few participants expressed their views as follows:

A guidance and counselling coordinator made this observation:

> *So, if you are so indiscipline, you don't come to school early, you come to school at 10 o'clock. By 2, you are gone. They are going to do soccer betting. They do chacha. What is the name? Gambling. They gamble and because they want these girls, some of them steal. They go as far as stealing money to go and gamble, get money, and then go buy expensive things to wear. So, the girls will see that, yeah, they are also, you know. … They go and gamble. They get money. They buy drugs. Weed, they smoke. … Because you are on drugs. They beat teachers. If you joke, they will beat you* (GCC# 8).

Another participant commented that:

> *… like I said not quite long ago, because they are indiscipline. They don't come to class. You know sometimes they even come to school or better still they will leave their houses in their school uniform that they are coming to school, but they don't end in classroom.*

Sometimes they get to school but not in the classroom, they will sit in canisters. They will be smoking; they will be selling drugs and even in the classroom. When their friends are in the class, they go to the dormitory, they break in and then they steal. … (AHD#5).

Yet, another participant said that:

…So, the child leaves the home, alright, especially the distance, the child leaves the home, right but doesn't get to the school, they are busy doing internet fraud or something some way, by 3pm or 4pm, he comes home, and you think your child went to school. …(AHA#7).

The data reveal that some of the students go to school as late as 10 a.m. instead of 7.30 a.m. and by 2 p.m. they are gone to engage in soccer betting and other gambling games to get money to buy expensive clothes and other things to attract girls. Again, some students end up stealing to buy drugs and when they do they go as far as beating their teachers in school. The data also indicate that some of these indiscipline students don't go to school when they leave home but go to their hide-outs to smoke and do drugs, even in their uniforms. At the end of the day these drugs influence them to break bounds to the dormitories and break into their friends' boxes, stealing their items. Others also engage in internet fraud at night and as a result sleep in class. Some of them don't go to school at all. This phenomenon of indiscipline has brought about increased rate of social vices such as stealing, theft, robbery and ritual murders, in our communities (Gambo & Muktar, 2017; Chimenga, 2017 & Danso, 2010)

Objective Three: Alternative measures to curb school indiscipline in Senior High Schools in Ghana

Regarding objective three (3) seven themes emerged as follows:

Theme One: Regulated Sanctions

The following were the opinions of the interviewees.

I think we should come out with stronger sanctions. The school should be given more powers to discipline students (AHA#4)

An assistant head (academic) of a school suggested that heads of Senior High Schools (SHS) in Ghana should be given powers/authority to discipline erring/deviant students. He suggested the use of strokes of canes, weeding, suspension or outright dismissal of the student in the light of the gravity of the offence. According to this assistant head, the use of some level of force would effectively deal with the growing indiscipline in our second cycle schools in Ghana. However, contrary to this suggestion, Ngwokabuenui (2015) suggests that teachers should correct students' mistakes with love rather than label them negatively and in cases of serious misconducts, parents of students should be invited to the school by the administrators for mutual discussion.

Closely related to the above opinion is the issue of stakeholders' engagement on the canker of students' indiscipline in SHS. The assistant head (academic) also opined that stakeholders of secondary education in Ghana should come together and dialogue to proffer alternative solutions that would effectively address the problem of indiscipline in schools. He suggested dialogue between, and among various interest groups such as the following:

- *Parent Associations (PA)*
- *Students Unions*
- *Media*
- *Civil society groups*
- *Law enforcement agencies*

These interest groups could brainstorm in a round table discussion or at an educational conference to suggest the way forward in addressing the social problem of students' indiscipline. This was what he said.

Let's engage stakeholders. Let's sit with stakeholders and come out with the rights, let's stakeholders bring in their inputs (AHA#3)**.**

One of the assistant head (academic) was of the view that the issue of students' indiscipline is deep seated and that it needs the collective engagement of interest groups to effectively resolve the issue.

Theme Two: Sensitization through the media

Here, again an assistant head suggested media engagements to address the problem of school indiscipline through television debate/discussions etc. This was what he said

I think they can help us a lot. This time, the media. Let's say virtually everything is done through the media. If the television and the radio and other social media help in talking about indiscipline in the schools, they raise some of these indiscipline issues, some of them can even invite experts to discuss some of these issues and come up with ways by which these problems can be solved.

From the data, the participant was of the view that the media today has become a powerful tool/channel in shaping societal thinking or actions including the school. The data revealed that the media has rich store of knowledge in influencing social issues and therefore if we rope in the media in this direction it can help to resolve students' indiscipline in our schools. Excerpts from the focus group are as follows:

- I think the GES can use our musicians or actors to portray to students the dangers of drug and substance abuse.
- Substance abuse has become common among our students. They take all kinds of substances that are detrimental to their health (non-prefect #4)

In a focus group interaction on the role of the media in fighting indiscipline in Ghanaian schools, non-prefects asserted that the Ghana Education Service (GES) can campaign on the television and radio on how indiscipline affects the students and the nation as a whole. For example, the GES can use musicians or actors in a role play to fight students' indiscipline in schools.

Theme Three: Media Restrictions

Although the media plays significant role in fighting students' indiscipline in schools, nevertheless, they sometimes engage in sensational or speculative reporting on the issue of school indiscipline. She remarked:

Yeah, the media sometimes blow issues out of proportion. So, I would say that even though they are communicating things happening in certain places for us to have a view or knowledge of, but they should also find time to get to the bottom of certain issues before they report (AHA#5)

The understanding here is that the media should be circumspect in their report of students' indiscipline in schools. They often blow issues out of proportion. The assistant head (academic) asserts that their role in students' indiscipline should rather be restricted.

Theme Four: Education through Religious Bodies

In curbing the social canker of students' indiscipline in second cycle educational institutions, religious bodies have a tremendous role to play. A participant observed:

a lot of people belong to some religions, one way or the other. So, I think that in the church and in the mosque, they can also do some education". Religious groups in various

communities can also assist in the struggles against indiscipline by using their religious avenues in this direction (AHA#5)

Rationally, the church/mosque is a powerful platform to be used to preach against school indiscipline. Inarguably, many of the students and other school personnel attend church services or go to the mosque regularly for worship. Such social gatherings can be used effectively to address the canker of indiscipline in schools. This position is corroborated by Ngwokabuenui (2015) when he argued that parents, the school and religious bodies that are charged with moral training of children should ensure that sound moral education is given to children.

During a focus group interaction, a house staff #8 suggested that students in their various denominational groups can also be used to preach against indiscipline.

- I think religious leaders who often lead students in worship sessions can seize the opportunity to preach against students' indiscipline in schools.
- Organise students in their denominational groups and educate them on disciplinary issues and how indiscipline will affect their future
- Religious leaders should organise and educate community members to help the school to achieve its aims
- Pastors and Imams should preach and emphasise discipline because the students will listen to them

The data indicate that religious bodies and community members have a stake in the overall development of the child. As stated by Amoah et al. (2015), to help children, develop healthy lives that show respect for human dignity, the modern notion of discipline suggests that all those who have the obligation should create creative ways to punish children.

Theme Five: motivating teachers/encouraging teacher discipline

There is a teacher factor in students' indiscipline in schools. In an interview, this is what school counselors said:

Teachers should discipline themselves. They should also stay away from the students. They should not have any social activities with female students. The moment they do that, the boys also rebel (GCC#3)

Parents should be responsible for their wards so that the children will not fall prey to teachers' antics (GCC#8)

In instances, where some teachers are indulging in amorous or sexual relationships with female students, it can lead to male students' rebellion and other social unrest in the school. As a result, Ngwokabuenui (2015) is of the view that school administrators, teachers, parents must set good examples for students to emulate. Blandina and Leonce (2021) share this opinion when they argued that school authorities should be good models for their students.

Theme Six: Returning to the Parent/Teacher Association (PTA) Regime.

A school counselor interviewed lamented on the withdrawal of the teacher's role in the former Parents and Teachers Association (PTA) and called for the return of the good old PTA in the schools. This was what the school counsellor #7 said *"teachers have a big role to play in the discipline of students in schools* (GCC#7)

So certain people, they need to be prayed for. Others also they need to be counseled. Others need to be given punishment (GCC#5)

An assistant head corroborated what the school counsellor #7 said. He stressed on the paramount importance of the school counselling services in helping to address student's indiscipline. He also suggested the reinstatement of the PTA to help fight indiscipline in schools.

In the former days parents and teachers worked together to ensure effective students learning and discipline. Today, it is no more the case. Teachers' role in the PTA has been taken away. It is now Parents Association (PA). This has greatly affected discipline in the schools. Teachers have almost been rendered powerless in the discipline of students. Therefore, to ensure discipline in schools, it is proper that school administrators, teachers and parents take measures to reduce indiscipline in schools through increased supervision (Blandina and Leonce 2021 & Ngwokabuenui, 2015).

Theme Seven: Review of the discipline codes by GES

In a focus group discussion, Participants (House staff 8) suggested the need to revise the existing GES code of conduct for both teachers and students because it has outlived its usefulness in effectively addressing student's indiscipline in the schools. This is necessary because it has become one-sided. In a focus group discussion, participants shared these views. Below are the excerpts:

- It has become obsolete and so psychologically, some teachers weep.
- The code of conduct does not work
- GES should spell out discipline issues properly

From the data, it seems that for the school to be managed effectively and achieve its objectives, discipline is required. To avoid and address student misbehaviour and to guarantee the smooth operation of classes and institutions, appropriate disciplinary measures must be implemented. This position is supported by Blandina and Leonce (2021) school rules should be in line with education policy and teachers and students must appreciate the code of conduct as a standard that must guide their overall life in the school environment. The social distance between the students and teachers should be reduced. School administrators should devise means of involving students in formulating rules and policies that affect them.

Conclusions and Implications

School discipline is essential for effective and efficient result-oriented teaching, learning as well as effective school administration. It is one of the bedrocks of schools' success in examinations. It is a shared responsibility among all the stakeholders of the school', namely, teachers, students, parents, civil society groups and the polity. The paper has considered the state of student indiscipline in senior high schools in Ghana and has reported the perspective of participants relative to the causes and effects, the danger it poses to nation building, and policy directions and measures needed to curb it. The results of the study demonstrated three cardinal factors accounting for student indiscipline, namely, the attitude of parents, the media and the removal of corporal punishment by the state (Ghana Education Service). This implies the need for renewed dialogue among these stakeholders regarding the task of maintaining discipline in schools, especially as it pertains to alternative means of inculcating the culture, values and morals of the Ghanaian society into students.

From the findings, it was also obvious that indiscipline in senior high schools lowered the authorities of teachers and brought about the decline in students' academic performance. These two effects of student indiscipline are so grave that one cannot guarantee the Ghanaian nation the expected growth and development of such indiscipline adolescents transitioning into adulthood.

This implies that parents, the school and other stakeholders must not toy with the future of their children and by extension the nation.

This brings to the fore alternatives disciplinary rules and policy directions needed to curb the canker of indiscipline in SHSs. Regarding this, the results pointed towards regulated sanction to be collectively instituted by students' unions, civil society organisations, law enforcement agencies, educational institutions, parents and religious bodies. This holistic or multidisciplinary approach to countering indiscipline is justified given the fact that the causes of indiscipline are drawn from multiple sources.

Recommendations

It is imperative to ensure that good behaviours and moral values are established, inculcated and maintained to promote healthy school environment for effective teaching and learning. Hence, based on the findings of the study, the following recommendations are offered:

1. Teachers and school authorities should involve students in setting school rules and regulations to promote student ownership of such arrangements to encourage students to assume responsibility for their behaviours.
2. School authorities, teachers and parents must show good examples that are worth emulating by students.
3. Concerted efforts of stakeholders such as parents, teachers, non-government organisations, educational authorities and past students should be initiated through national conference under the auspices of the Ministry of Education and Institute for Educational Research and Innovation Studies, UEW to find a lasting solution to these creeping social canker.
4. Parents, religious bodies, and the media as agents of socialisation and moral trainers of children should ensure that sound moral education is given to children.

Alternative disciplinary measures such as cooperation as compared to punitive and harsh disciplinary measures should be enforced by educators to inspire hope and friendliness among children and teachers to promote positive behaviour.

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TEACHER RETENTION IN BASIC SCHOOLS OF THEIR HOME COMMUNITIES: IMPLICATION FOR TEACHER DEPLOYMENT POLICY

Cosmos Kwame Dzikunu
Senior Research Fellow
Centre for Educational Policy Studies
Institute for Education Research and Innovation Studies
University of Education Winneba
cosmosdzikunu@gmail.com
+233506583817

Dr. Emmanuel Tamanja
Senior Research Fellow
National Centre for Research into Basic Education
Institute for Education Research and Innovation Studies
University of Education, Winneba

Baraatu Abdulai Yakubu
Deputy Director
Ghana Education Service
Nanumba South District
&

Regina Oduro
Principal Administrative Assistant
Students' Affairs
University of Education, Winneba

ABSTRACT

Teachers' retention continue to remain a challenge, especially in the rural and peri-urban areas of Ghana. The purpose of this study was to examine the various factors that are responsible for teacher retention in their home communities and how these factors are militating against their continuing stay in the profession in the Nanumba South District. A total of seventy (76) respondents were surveyed for this study. This comprises twenty-four teachers from Junior High Schools and fifty-two (52) teachers from the primary schools. The purposive stratified sampling technique was adopted, and data collected with a structured questionnaire. The data collected were analyzed using descriptive statistics. The study revealed that the motivation for accepting posting to their home community schools included the strong motivation to give back to the communities and the respect they received from community members. It is also established that teachers were willing to continue to stay in their communities because they were respected and motivated by the community's members. The collaboration teachers received from each other and

remedial classes they organize helped to improve teaching and learning. Economic pressure from family members and the lack of interest of parents in education were some reasons that made teachers exited their home communities. It is therefore recommended that the GES should organise orientation fora for communities to embrace their own kind to their home communities as teachers. The teachers should also be encouraged to accept posting to their home communities through specialized awards and incentives. Educational infrastructure should be equitably distributed across the district. There should be a special package for teachers who accept postings to their home communities in rural settings to enable them to develop themselves academically.

Key words: Teacher retention, home communities, teacher attrition

INTRODUCTION

Formal education plays an enormous role in our present world of socio-economic development because it enhances knowledge and technology acquisition, which have become key tools in leveraging competitive advantage (Oduro, 2000). Baah, Otoo, and Osei-Boateng (2009) found that the quality of a country's stock of human capital directly influences the extent to which knowledge and technology can enhance productivity and improve the well-being of citizens. Salahu and Aminu (2010) emphasised that education has become the most important social service in the world today, and a major source of national development.

Calxton (2008) posits that internationally, without exception to Ghana, research have proven that lack of quality teachers inhibits good academic performance of pupils. Therefore, nations that ranked high on global assessment have established good policies to ensure that they deploy and retain qualified teachers. In Ghana, however, the situation is different. Wonyor (2006) found that the challenge of teachers' attrition in Ghana's pre-tertiary education system grew from worse to worst when Dr. Nkrumah extended the fee-free compulsory education to all parts of the country in 1961. This decision called for the extension of free compulsory education, which resulted in many children enrolling in schools, and thus increasing the need for more teachers. To increase teacher supply, government recruited untrained teachers to fill the gap, leading to too many children supposedly educated, but in reality, these children lacked quality education.

In the United States of America it has become the practice of many states to declare teaching vacancies in district every year by subject area, grade level and geographical location. The picture does not look different in the United Kingdom where it is reported that the nation faces an uphill battle to fill all classrooms with qualified teachers (Eurydice, 2002). Generally, among member countries of the Organization for Economic Cooperation and Development (OECD), quantitative shortages of teachers are reported (OECD, 2005). In the Western world, therefore, the shortage of teachers thus seems to be a topic of discussion and research on a continuing basis.

In the US teacher attrition has grown by 50 percent over the past fifteen years, and the national teacher turnover rate has risen to 16.8 percent. In urban schools it is over 20 percent, and in some schools and districts, the teacher turnover rate is higher than the student dropout rate (Kain, 2011). This high rate of teacher turnover in the U.S. school systems costs more than $7 billion a year (Hernandez, 2007). The situation in Ghana is not different from that of the United States. A report of a survey on teacher attrition in 2009 commissioned by the Ghana National Association of Teachers (GNAT) and the Teachers and Educational Workers Union (TEWU) revealed a very high teacher attrition rate in Ghana. The survey revealed that the Ghana Education Service (GES)

estimates that about 10,000 teachers leave the classroom every year for other professions (GNAT, 2009). The high rate of teacher attrition impacts negatively on school improvement efforts as it disrupts the stability and continuity of teaching. Whereas high-performing schools are distinguished by stability and continuity of teaching, studies show that teaching traditionally has been characterized as an occupation with a very high turnover rate (Lawrence, 1999). This affirms the situation in Ghana where the teacher training institutions in the country produce so many teachers every year but there is still shortage of teachers because they are not retained in the profession. This is because teachers see the profession as a stop gap employment to enable them get their dream jobs.

The popular saying in Ghana that "If you can read this, Thank the Teacher" clearly depicts that teachers play a pivotal role in the society and that they are indispensable ingredient in national development. Teachers are therefore the bedrock for all human learning, and they are the hub around which individual citizens are made to realize their full potential to serve their nations (Adu, 2005). Caillods, as cited in Ariko and Simatwa (2011), maintains that the art of teaching is a developmental process, and it involves a complex set of skills, many of which can only be well polished on uninterrupted job experience, hence the issue of teacher attrition impacts negatively on teaching and learning process since it does not ensure continuity in the teaching and learning process.

The teaching profession has shown and continues to show some glimpses of impoverishment. Most of the people who enter the teaching profession these days do not take it as a lifelong career. It is sad to note that, some teachers find themselves in the teaching profession due to nonexistence of other job opportunities while others also consider teaching as a stepping stone or a spring board to enter into other professions. Such teachers leave the teaching profession with the least chance they get, and this situation creates teacher shortages in our schools (Koomson, 2005). The issue of teacher shortage is a big educational challenge in Ghana. Getting a chance to train and recruit teachers is a long, expensive and uncertain process. It has therefore, been essential to safeguard the exit of the few existing teachers by the school managements. The problem of teachers leaving the classroom seems to be on the increase every year, and this suggests that though so much money is spent on training and recruiting teachers, little or no attention is paid to their retention (GNAT, 2009; Bame, 1991; Vroom, 1998).

Within the sphere of challenges, teacher shortage, which is largely associated with low rate of teacher training and high level of teacher retention and attrition, has been identified as one of the most foreseeable but unsolvable problems facing the education system in Ghana and Northern Region in particular. The actual problem that this study seeks to address, therefore, was to investigate the various factors that are militating against retention of teachers retention in schools of their home communities. Nanumba South District. The question to ask now is "what is the driving force?" or "what factors militate against retention of teachers in the teaching profession in their communities of origin in Ghana?" This is what this study seeks to investigate.

Purpose of Study

The purpose of this study was to examine the various factors that are responsible for teacher attrition especially in their home communities and how these factors are militating against their retention in the profession in the Nanumba South District of the Northern Region of Ghana.

Research Questions

The following questions were formulated to guide the study:

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1. What are the factors that will lead to teachers accepting posting to their home community schools?
2. What are the factors that contribute to teachers remaining at post in their home communities' schools?
3. How has posting of teachers to their home communities' schools affect teaching and learning outcomes?
4. Under what conditions will teachers choose to leave their home community's school in the Nanumba District?

LITERATURE REVIEW

Teacher Attrition

Researchers have identified some reasons that accounts for attrition: Smithers and Robinson (2001) argued that teachers in the United Kingdom (UK) are quitting from the teaching profession because of workload that comes with teaching. This means that some teachers are unable to cope with the workload that comes with working as a teacher. This may result in some teachers moving from one school to another or from one geographical location where the work load appear to be high to another place where the work load appear to be less. The World Bank in 2007, reported that teachers who consider themselves qualified are always unwilling to stay in the remote areas. This phenomenon is very common in Ghana where teachers after their initial postings will mostly want to be re-posted since they feel where they are posted they are more than qualified to teach there. This makes it look like rural environment are the preserve of the "unqualified'' teachers. This situation mostly leaves the rural areas with untrained and or teachers who are not professionals. The study of Akyeampong & Lewin (2002) supported the study of World Bank Report (2007) that in Ghana, over 80 percent of teachers preferred to teach in urban schools. The study of Hanushek, Kain and Rivkin (2002) reiterated that poor professional working conditions play a substantial role in decisions to leave teaching in a particular school or district. Chediel (2010) hinted that teachers abandon the teaching profession to pursue further courses at the postgraduate level such as law, administration and information technology, which they consider to be lucrative than the teaching profession.

In Ghana the study of Sam, Effah and Osei-Owusu (2014) enumerated some factors that compelled teachers to quit teaching as low salaries, poor conditions of service, low status (prestige) for the teaching profession, and the lack of incentives associated with the job. Cobbold (2015) posits that teachers in Ghanaian public schools quit their post because they are not satisfied with their salaries. Van den Berg (2002) established that overemphasis on standards, a lack of participation in decision-making, failure to provide instructional resources, lack of support from administration, and lack of trust in the expertise of teachers increase job dissatisfaction and lack of retention of teachers. In the view of Manna and Tesfay (2000) teachers quit their profession due to low recognition they receive from the general public, a perception that forces them to quit for a better job.

Conditions that Increase Teacher Retention

Billingsley (2004) identified some factors that influence teachers to remain in the profession as; good working conditions provided by school administrators; provision of conducive environment; decent relations among school directors/managers and teachers; reduction of workload and unnecessary stress. Other researchers confirmed retention of teachers through mentoring and induction, financial incentives, and attractive salary as well as equal chance for teacher leadership (Lasagna, 2009; McInerney, Ganotice, King, Marsh & Morin, 2015).

In Ghana, Tawia-Armah (2010) outlined some conditions that will attract teachers to stay in the profession as reduction of class sizes, accommodation for teachers, and teacher's involvement in decision-making. To ensure that school are populated with required number of teachers which involves increasing the number of teachers, involves employing both monetary and nonmonetary incentives to make teaching more attractive and more flexible to enter. One measure is to lower teacher qualification standards by employing less qualified people without full certification or asking certified teachers to teach subjects in which they have no qualification, referred to in the literature as out-of-license and out-of-field teaching respectively. Some countries recruit retired and foreign teachers. Another option is to restructure teacher education programmes and certification processes to produce more teachers at short duration and minimum cost. Countries such as Indonesia, Madagascar, Nicaragua and Thailand (ILO, 1991a) and the USA (Darling-Hammond, 2000) have tried it, but the quality of teachers produced through those alternative training and certification routes, as compared to teachers trained by the traditional routes, is widely debated among researchers. In Ghanaian context, there appear more trained teachers not being employed due to budgetary constraints while some schools are existing without teachers.

The Method

To undertake this study, descriptive survey method was used. Descriptive research aims to accurately and systematically describe a population, situation or phenomenon. It can answer what, where, when and how questions. It is very useful when conducting research whose aim is to identify characteristics, frequencies, trends, correlations, and categories. This method was selected because it is appropriate when the aim of the study is to get an exact description of current status (Seyoum & Ayalew, 1989). Besides, they stated that descriptive research method is a fact finding study with adequate and accurate interpretation of the findings. It describes with emphases on what actually exists such as current conditions, practices, situations or any phenomena. It is also suitable for this kind of research. Particularly, descriptive survey method is one which is commonly used in educational research.

The population for the study comprised the representation of all teachers in the Kukuo Circuit. The Circuit has two Junior High **Schools** and eight Primary Schools. The total teacher population in the circuit currently is ninety-four (94). This Comprising of fifty-six (56) males and thirty-eight (38) females. In a quantitative study, sample can be generalised and possibly replicated by future researchers. To be able to replicate and generalise sampling results, the sampling size and techniques should not be arbitrarily determined (Yamane 1973). To avoid the arbitrariness, the study relied on scientific means to estimate the sampling size. One of the fundamental requirements in determining the sample size is to calculate the population size of the target population. One of the most popular means of determining the sampling size is the Taro Yamane formula with 95% confidence level (Yamane, 1973). The calculation formula of Taro Yamane is presented as follows:

$$S = \frac{P}{1+Pe^2} \qquad 1$$

Where, S- sample size required
P- Represents the total population
e- Denotes the probability of error (%)
By substituting the population (P) of ninety-four (94) into the equation (1) and with probability of error level of confidence of 5 percent, the formula can be presented as:

$S = \frac{94}{1+94(0.05)^2} = 76$

Therefore, from Yamane model the minimum ideal sample size is 76 out of 94 and therefore 76 respondents were selected for the study.

Purposive sampling is used to select the three (3) Junior High Schools and eight primary schools to ensure that the selected schools are spread around the entire geographical area of the circuit. Simple random sampling is then used to select 24 and 52 teachers from the Junior High Schools and the primary schools respectively. This made the total sample size of 76 respondents.

Structured questionnaire was used to collect the data. The questionnaire contained 48 Likert-type scale items that consisted of motivation to accept postings to home community schools, motivations to continue to stay in their home communities' schools, it effects on teaching and learning and reasons for which they may leave their own community schools are presented accordingly. A Likert-type scale of one (1) to five (5) was presented to respondents to select based on their individual situation and response. A total of 70 questionnaires were retrieved and analyzed. The data were tabulated for each research question. The salient data tabulated were analyzed and presented using descriptive statistics.

Data Quality and Ethical Issues

In a social survey such as this, ethics is considered the responsibilities that researchers have or should have towards those who participate in the research. Therefore, assuring the participants in a research about your intention to protect their identity is very vital in every research. The researchers considered ethical treatment during the research process to reinforce sanity of the study. The teachers' names were coded with numbers that linked with the data collected hence their names were not used in reporting the findings of this study. Teachers' privacies were never invaded regarding the kind of reasons they will want to leave the circuit by taking transfers. With all these in place, issues of ethical concerns on privacy and confidentiality were to a large extent covered because all the participants were assured of anonymity of their given information.

Results and Discussions

Research Question One: What are the factors that will lead to teachers accepting posting to their own community schools?

To investigate the factors that will lead to teachers accepting posting to their own community schools in the Kukuo circuit of the Nanumba South District, A decision rule of a mean of 4.5-5.0 is perceived as strongly agree, a mean of 4.4-3.5 as agree, neutral or indifferent while means of 2.4-1.5 and 1.4-0.1 are perceived as disagree and strongly disagree respectively. Also, SA= Strongly Agree, A= Agree, N=Neutral, D= Disagree, SD= Strongly Disagree, M= Mean, and SD= Standard deviation have been adopted. The results are represented in Table 1. This decision rule is applicable to the rest of the study.

Table 1 represent the views of the respondents. The results in Table 1 indicate that, 62 respondents strongly agreed that they accepted posting to their communities to teach because of a strong spirit to give back to society (M=4.74; SD=0.83). This was testified by majority of the respondents

(88.6%) who strongly agreed with the statement whilst 2(2.9%) of the respondents disagreed with the statement. It was established that majority of the teachers strongly agreed that they accepted posting to their home communities because these communities are very peaceful to live in (M=4.45; SD=0.85). About 41(58.6%) of respondents strongly agreed that they accepted posting to teach in their home communities because of the peaceful nature of those communities, on the other hand only 1(1.4%) strongly disagreed.

Table 1: Teacher's motivation for accepting posting to their own communities

SN	STATEMENT: motivation for accepting posting to own community	SD F (%)	D F (%)	N F (%)	A F (%)	SA F (%)	MEAN	SD
1	I am very happy with my current school	2(2.9%)	1(1.4%)	7(10%)	15(21.5%)	45(64.5%)	4.42	0.94
2	The pupils are friendly	5(7.1%)	2(2.9%)	1(1.4%)	16(22.9%)	46(65.7%)	4.37	1.14
3	There is enough teaching and learning material	4(5.7%)	14(20%)	23(32.9%)	15(21.4%)	14(20%)	3.30	1.17
4	There is good community support to school and teachers	1(1.4%)	2(2.9%)	3(4.3%)	28(40%)	36(51%)	4.37	0.82
5	There is good support for teachers from the district office for education	1(1.4%)	2(2.9%)	3(4.3%)	24(34.3%)	40(57.1%)	4.42	0.82
6	The teachers are adequately motivated by school management committee	0(0%)	1(1.4%)	3(4.3%)	42(60%)	24(34.3%)	4.27	0.61
7	There is little friction between the school administration and community members	3(4.3%)	4(4.3%)	2(2.9%)	23(32.9%)	38(54%)	4.27	1.06
8	The community is very peaceful to live in	1(1.4%)	2(1.4%)	2(2.9%)	24(34.3%)	41(58.6%)	4.45	0.81
9	Cost of living is cheaper compared to other communities	14(20%)	2(2.9%)	5(7.1%)	35(50%)	14(20%)	3.47	1.37
10	There is a strong spirit in me to give back to society	2(2.9%)	1(1.4%)	2(2.9%)	3(4.3%)	62(88.6%)	4.74	0.83

11	There is respect for teachers in the community	0(0%)	1(1.4%)	3(4.3%)	10(14.3%)	56(80%)	4.74	0.68

****Multiple Reponses**

Source: field data, 2022

From Table 1, majority of the teachers, 56(80%) of the respondents strongly agreed that they accepted posting to their home communities' schools because there was respect for teachers (M=4.74 SD=0.68). This means that if the communities work towards ensuring a peaceful environment it will attract more of their community members who graduate as teachers to accept postings to these communities to work as teachers. Majority of the respondents appear indifferent about the question of availability of teaching learning materials. It was established that most teachers were not sure whether the availability of teaching learning materials or not had any influence on their willingness to accept posing to their own communities as teachers (M=3.30 SD=1.17).

Table 1 also shows that majority of the respondents agreed that the good support that school and teachers received from the community served as strong motivation to accept posting to their own communities (M=4.37 SD=0.82). The results also indicated that respondents generally agreed that the support they enjoyed from the district education office was a motivation to accept postings to their communities (M=4.42 SD=0.82). About 57% teachers surveyed strongly agreed that there was good support from the district education office while 1.4% of the respondents strongly disagreed.

Research question two: What are the factors that contributed to teachers remaining at post in their own communities' schools?

The second objective of the study was to examine the factors that contributed to teachers remaining at post in their home communities' schools after being posted there. A number of statement were therefore posed to the respondents to determine their level of agreement or disagreement with each sentence. The results are presented in Table 2.

It was established that majority of the respondents were willing to remain in their home communities' schools because the communities' members were generally friendly towards teachers (M=4.81; SD=0.62). About 62(88.8%) of respondents strongly agreed that the communities' members were friendly towards teachers while about 1(1.4%) strongly disagreed with the statement. Also, the respondents were willing to continue to remain in their home communities' schools because they were happy with the teacher-teacher relationships that existed in the schools (M=4.57; SD=1.00). This response had 57(81.4%) who strongly agreed that they were happy with the teacher-teacher relationship, on the other hand 2(2.9%) strongly disagreed with this statement. This means that natives and non-native teachers coexist in the school environment without any form of mistrust. The results also revealed that teachers were willing to stay in their home communities of posting to get enough land to be able to farm. Since the circuit is predominantly a farming enclaves, teachers who accept postings to their home communities in this circuit are willing to stay because they get enough land to farm (M=4.67 SD=0.68).

Table 2: Motivation to remain at post in own communities of schools

SN	Statement : motivation to remain at post	SDF (%)	D F (%)	N F (%)	A F(%)	SA F (%)	M	SD
1	I am very happy with my current school	1(1.4%)	2(2.9%)	3(4.3%)	14(20%)	50(71.4%)	4.57	0.83
2	I am happy with my stay in the school because of the good relationship with Colleague teachers	0	0	2(2.9%)	23(32.9%)	45(64%)	4.61	0.55
3	I am happy with my stay in the school because of the good relationship with Community members	1(1.4%)	5(7.1%)	3(4.3%)	10(14.3%)	51(72.9%)	4.50	0.97
4	I am happy with my stay in the school because of the good relationship with. Pupils'	2(2.9%)	3(4.3%)	4(5.7%)	27(38.6%)	34(48.6%)	4.26	0.96
5	I am happy with my stay in the school because of the good relationship with headteacher	0	8(11.4%)	4(5.7%)	32(45.7%)	26(37.1%)	4.08	0.94
6	I am happy with my stay in the school because of the good relationship with Officers from office	1(1.4%)	1(1.4%)	21(30.0%)	32(45.7%)	15(21.4%)	3.84	0.83
7	I don't want to leave my present school	2(2.9%)	1(1.4%)	3(4.3%)	16(22.9%)	48(68.6%)	4.52	0.88
8	I am happy with my present school;	2(2.9%)	2(2.9%)	3(4.3%)	13(18.65)	50(71.4%)	4.52	0.93
9	The community members are very friendly towards teachers	1(1.4%)	0	2(2.9%)	5(7.1%)	62(88.6%)	4.81	0.62
10	The SMC motivate teachers to stay at school	1(1.4%)	2(2.9%)	6(8.6%)	7(10.0%)	54(77.1%)	4.59	0.88
11	The community support me land to farm if I need	0	0	8(11.4%)	7(10.0%)	55(78.6%)	4.67	0.68
12	I am very happy with Community-school relation	0	0	3(4.3%)	45(64.3%)	22(31.4%)	4.27	0.54

13	I am very happy with Teacher-teacher relation	2(2.9%)	3(4.3%)	5(7.1%)	3(4.3%)	57(81.4%)	4.57	1.00
14	I am very happy with Head teacher-teacher relation	1(1.4%)	2(2.9%)	9(12.9%)	12(17.1%)	46(65.7%)	4.43	0.93
15	I am very happy with Teacher- pupil relation	1(1.4%)	2(2.9%)	0	13(18.6)	54(77.1%)	4.67	0.76

Multiple responses

Source: field survey, 2020

The data also revealed that about 77.1% of the respondents strongly agreed that they were willing to stay in their home communities' schools because the school management committees in the communities motivate them to stay, only, 1.4% of the respondents thought otherwise (M=4.59 SD=0.88).This finding contrasts with the assertion that many beginning teachers leave teaching because they think they are neglected by the management system once they are posted to schools (Cobbold, 2007). Majority of the respondents (77 %) strongly agreed that they were willing to remain in their own communities' schools because there existed a good pupil teacher relationship, an atmosphere that enhances good teaching and learning. Only about 1.4% of the teachers strongly disagreed that they are happy with pupil teacher relationship. The study also revealed that teachers generally agreed that they were happy with relationship that existed between head teachers and teachers in their communities' school (M=4.43 SD=0.93). From Table 4, 46(65.7%) respondents strongly agreed that they were happy with head teacher –teacher relationships that existed in their schools and was a strong motivation to continue to remain in their own communities' schools. In in study, Malloy and Allen found that, family-like support between teachers and the principal in times of personal stress, illness or need, faculty social gatherings and reduced assignments for teachers facing a particular period of stress enhanced teacher retention in schools.

Research Question three: What are the effects of teachers who are posted to their own communities' school on teaching and learning outcomes?

The third objective of the study was to determine how teachers remaining in their home communities affect teaching and learning outcomes. The results are presented in Table 3.

Table 3: Effect of teachers who are posted to their home communities' schools on teaching and learning outcomes

SN	*STATEMENT: effects of remaining in the community on teaching and learning activities*	*SDF(%)*	*D F(%)*	*N F (%)*	*A F(%)*	*SA F(%)*	*MEAN*	*SDEV*
1	Community level activities affect teaching and learning	6(8.6%)	1(1.4%)	6(8.6%)	13(18.6%)	44(62.9%)	4.26	1.22
2	Do you have respect from the pupils because you teach in this community	1(1.4%)	2(2.9%)	2(2.9%)	9(12.9%)	55(80.0%)	4.67	0.79
3	What is the level of respect to you compared to the other teachers	1(1.4%)	2(2.9%)	4(5.7%)	9(12.9)	54(77.1%)	4.61	0.89
4	Do you have any remedial classes for the pupils	1(1.4%)	1(1.4%)	3	18(25.7%)	48(68.6%)	4.59	0.75
5	What is the attitude of students towards classroom activities	1(1.4%)	6(8.6%)	3(4.3%)	13(18.6%)	47(67.1%)	4.41	0.01
6	There is a strong collaboration between teacher and community members to enhance teaching and learning	2(2.9%)	0	2(2.9%)	16(22.9%)	50(71.4%)	4.60	0.81
7	Interaction with pupils is encouraging	1(1.4%)	1(1.4%)	4(5.7%)	18(25.7%)	46(65.7%)	4.53	0.79
8	There is a strong Interaction with colleague teachers	1(1.4%)	0	3(4.3%)	13(18.6%)	53(75.7%)	4.67	0.70

9	There is good interpersonal interaction with head teacher	0	0	5(7.1%)	11(15.7%)	54(77.1%)	4.70	0.60

Multiple Responses

Source: Field Data, 2022

From Table 3, it is indicated that majority of the respondents, 80% strongly agreed that they received the needed respect from pupils who they thought and had served as a strong motivation to give of their best by improving learning outcomes in the schools.

The results also established that teachers who teach in their home communities strongly agreed that the level of respect they receive from community members compared to other teachers was sufficient to enable them to deliver their best and hence improvement in learning outcomes (M=4.61 SD=0.89). About 77.1% respondents strongly agreed compared with 1.4% who strongly disagreed. The results also show that about 77% of the respondents strongly agreed that there was a good interpersonal relationship with head teachers of schools leading to improved teaching and learning outcomes (M=4.70 SD= 0.60). Table 5 shows that 53(75.7%) of the teachers strongly agreed that there was strong interaction with colleagues teachers which lead to sharing of knowledge and idea to enable them deliver well in the classroom (M=4.67 SD= 0.70). The data indicate that about 68.6% of respondents strongly agreed that they were able to organize remedial classes for the pupils because they teach and stay in their home communities. The remedial classes is aimed at improving teaching and learning outcomes.

Research Question four: Under what conditions teacher will choose to leave their own communities school?

The last and final objective of the research work was to identify the conditions that would necessitate teachers choosing to leave their own communities school. The data are in Table 4

Table 4: Conditions that make one leave own communities' schools.

SN	STATEMENT : challenges of being a teacher in the community	SD F (%)	D F (%)	N F (%)	A F (%)	SA F (%)	MEAN	SDEV
1	Being a teacher in this community makes it difficult for me to develop academically	16(22.9%)	0	6(8.6%)	4(5.7%)	44(62.9%)	3.86	1.67
2	The community members do not make me feel like a teacher;	56(80.0%)	12(17.1%)	1(1.4%)	1(1.4%)	0	1.24	0.55
3	It is difficult to resolve my salary challenges	56(80.0%)	11(15.7%)	3(4.3%)	0	0	1.24	0.52
4	Information about promotions are not timely	15(21.4%)	37(52.9%)	2(2.9%)	2(2.9%)	14(20.0%)	2.47	1.40
5	The cost of living in this community is high	46(65%)	13(18.6%)	0	3(4.3%)	8(11.4%)	1.77	1.35
6	Pupils are not interested in education	0	4(5.7%)	0	6(8.6%)	60(85.7%)	4.74	0.74
7	Parents don't take education seriously	0	20(28.6%)	1(1.4%)	2(2.9%)	47(67.1%)	4.09	1.36
8	Colleagues teachers make fun of me	45(64.3%)	23(32.9%)	0	2(2.9%)	0	1.41	0.65
9	Head teacher not good in administrator	45(64%)	21(30.0%)	1(1.4%)	2(2.9%)	1(1.4%)	1.47	0.79
10	Lack of educational infrastructure	1(1.4%)	14(20.0%)	0	10(14%)	45(64.3%)	4.200	1.25

11	Fear of conflict in the area	34(48.6%)	27(38.6%)	1(1.4%)	3(4.3%)	5(7.1%)	1.82	1.14
12	The distance to the district office is too far	8(11.4%)	25(35.7%)	2(2.9%)	2(2.9%)	33(47.1%)	3.39	1.62
13	Lack of information about the promotions and upgrading	16(22.9%)	38(54.3%)	2(2.9%)	1(1.4%)	13(18.6%)	2.39	1.37
14	There is pressure from family members	11(15.7%)	2(2.9%)	2(2.9%)	21(20.0%)	34(48.6%)	3.93	1.44

Multiple Response

Source: Field survey, 2020

From Table 4, majority of the respondents strongly agreed that one of the conditions under which they may leave was economic pressure from family members (M=3.93 SD=1.44). About 48.6% of the respondents strongly agreed to this statement. The study also revealed respondents strongly agreed that pupils were not interested in education that may lead to teachers leaving their home community school. From Table 4, 60(85.7%) of the respondents strongly agreed that this was a serious challenge.

The study also revealed that parents were not interested in the education of their children. This may lead to teachers leaving their home community school. About 66.7% of the respondents strongly agreed with this while 20% disagreed.

Majority of teachers were also willing to leave their home community schools because there was poor educational infrastructure in these schools. As indicated in Table 6, 45(64.3%) of the respondents strongly agreed that this was a challenge. About sixty two (62%) of teachers were no longer willing to stay in their home communities' schools because it was difficulty to develop academically.

Conclusions

The results from the study are sufficient to conclude that many teachers who hailed from the Kukuo circuit in the Nanumba South District were willing to accept posting to their own community schools generally because there was strong commitment from them to give back to society more especially the communities they come from as well the respect given to them by their own people. The motivation from SMCs to teachers and the good relationship that existed between them were encouraging for them to remain and continue to teach in their own community's schools. Factors that enhance teaching and learning from the study were the strong collaboration between teachers' and the respect the teachers received from pupils and parents. Some challenges that may lead to teachers exiting their own communities' schools included poor educational infrastructure as well as pressure for support from family members. The willingness of teachers to accept postings to their own communities' schools is a strong incentive for pupils in those communities to see them as role models as well as reduce pressure on the local and national government to provide teachers quarters.

Recommendations

In the light of conclusions reached, the following recommendations have been made.

1. There is the urgent need to support and motivate teachers for improved performance by providing opportunities for professional growth. The MOE and GES should initiate steps in that direction through continuous professional development, and supply of teaching learning resources, and equipment to enhance effective teaching and learning in schools in rural communities.

2. The Ministry of Education should also encourage teachers to accept posting to their own communities through specialized awards and incentives such as soft housing loans, bicycles and motor bikes.
3. The GES Council and Ministry of Education should initiate policy that will ensure that the Ghana Education Trust Fund allocate money for free medical care and also pay insurance premium for teachers, especially those teaching in rural communities.

4. Academic progression special package for teachers who accept postings to their own communities to enable them develop themselves academically within a minimum **of two** years continuous service. In the face of dwindling funding for study leave with pay, MOE should support teachers doing sandwich and distance programmes, especially, teachers in rural communities
5. The GES and other stakeholders must urgently facilitate and increase the level of financial rewards and incentive packages for teachers to reduce attrition in the teaching profession
6. The district assemblies should, as a matter of urgency, fast track its social development fund to provide **accommodation**, means of transport, clinics and other social supports to improve general condition of teachers in rural and peri urban communities within their jurisdiction
7. Parents, religious bodies and civil society as partners in education delivery should contribute to the development of community schools through donations, communal labour and other forms of assistance that promote teacher retention

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