

per dimension contained within each of the 6 dimensions.

Participants would respond using a 6 point format: strongly disagree (1), moderately disagree (2), slightly disagree (3), slightly agree (4), moderately agree (5), strongly agree (6). E.g. In general, I feel I am in charge of the situation in which I live. The internal consistency of autonomy (.83), environmental mastery (.86), personal growth (.85), positive relations with others (.88), purpose in life (.88), self-acceptance (.91), have been reported by Ryffs, (1989).

Attitudinal Disposition Questionnaire (ADQ)
Attitudinal Disposition Questionnaire (ADQ)
is a 10-item

questionnaire developed by the researcher. The items were measured on a likert type scale from strongly disagree (1) to strongly agree (5). The instrument was validated to ensure that it will measure what is ought to measure and a correlation coefficient of 0.96 was obtained indicating that the instrument is reliable for the study.

Result

Ho1: There is no significant direct effect of attitudinal disposition to good governance on achievement striving behaviour independent of psychological wellbeing and emotional intelligence

Table 1: Model summary of direct effect of attitudinal disposition to good governance on achievement striving behaviour independent of psychological wellbeing and emotional intelligence

Tests of Between-Subjects Effects

Dependent Variable: achievement striving

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|-----------------|-------------------------|-----|-------------|--------|------|---------------------|
| Corrected Model | 3041.715(a) | 23 | 132.248 | 25.223 | .000 | .819 |
| Intercept | 215.760 | 1 | 215.760 | 41.151 | .000 | .243 |
| Psy | 2.175 | 1 | 2.175 | .415 | .521 | .003 |
| Emoti | .000 | 1 | .000 | .000 | .993 | .000 |
| Attid | 2694.252 | 21 | 128.298 | 24.470 | .000 | .801 |
| Error | 671.120 | 128 | 5.243 | | | |
| Total | 442313.000 | 152 | | | | |
| Corrected Total | 3712.836 | 151 | | | | |

a R Squared = .819 (Adjusted R Squared = .787)

Table 1 showed a significant result (f=24.470; P,< .05). The null hypothesis is therefore rejected in favour of the alternate hypothesis. It is thus concluded that there is a significant direct effect of attitudinal disposition on achievement striving behaviour independent of psychology wellbeing and emotional intelligence. Furthermore, 78.7% of the variance in the model is explain by attitudinal

disposition to good governance (Adj. R Squared = .787).

Ho2: There is no significant indirect effect of attitudinal disposition to good governance on achievement striving behaviour through psychological wellbeing and emotional intelligence

Table 2: Model summary of indirect effect of attitudinal disposition to good governance on achievement striving behaviour through of psychological wellbeing and emotional intelligence

Tests of Between-Subjects Effects

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power(a) |
|-----------------|-------------------------|-----|-------------|--------|------|---------------------|--------------------|-------------------|
| Corrected Model | 3041.715(b) | 23 | 132.248 | 25.223 | .000 | .819 | 580.134 | 1.000 |
| Intercept | 215.760 | 1 | 215.760 | 41.151 | .000 | .243 | 41.151 | 1.000 |
| Psywel | 2.175 | 1 | 2.175 | .415 | .521 | .003 | .415 | .098 |
| Emotion | .000 | 1 | .000 | .000 | .993 | .000 | .000 | .050 |
| Attitude | 2694.252 | 21 | 128.298 | 24.470 | .000 | .801 | 513.863 | 1.000 |
| Error | 671.120 | 128 | 5.243 | | | | | |
| Total | 442313.000 | 152 | | | | | | |
| Corrected Total | 3712.836 | 151 | | | | | | |

Dependent Variable: achievement striving

a. Computed using alpha = .05 b. R Squared = .819 (Adjusted R Squared = .787)

Results in Table 2 revealed that there was a significant indirect effect of attitudinal disposition on achievement striving behaviour through psychological wellbeing and emotional intelligence. The result further indicated that there was partial mediating effect of psychological wellbeing and emotional intelligence on attitudinal disposition and achievement striving behaviour ($R^2 = .819$; $F = 24.823$; $Adj. R^2 = .787$; $P < .05$), this implies that there is significant mediating effect of psychological wellbeing and

emotional intelligence in the relationship between attitudinal disposition and achievement striving behaviour. The mediating effect of psychological wellbeing on the relationship between attitudinal disposition and achievement striving behaviour (observe power = .098 ; $t = .644$) is stronger than the effect of emotional intelligence (observe power .050; $t = .009$). Therefore the null hypothesis is hereby rejected

Ho3: There is no significant indirect effect of attitudinal disposition to good governance on achievement striving behaviour through psychological wellbeing

Table 3: Model summary of indirect effect of attitudinal disposition to good governance on achievement striving behaviour through of psychological wellbeing

Tests of Between-Subjects Effects

Dependent Variable: achievement striving

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared | Noncent. Parameter | Observed Power(a) |
|-----------------|-------------------------|-----|-------------|--------|------|---------------------|--------------------|-------------------|
| Corrected Model | 3041.715(b) | 22 | 138.260 | 26.576 | .000 | .819 | 584.665 | 1.000 |
| Intercept | 232.339 | 1 | 232.339 | 44.659 | .000 | .257 | 44.659 | 1.000 |
| Psywel | 9.777 | 1 | 9.777 | 1.879 | .173 | .014 | 1.879 | .275 |
| Attitude | 2711.926 | 21 | 129.139 | 24.823 | .000 | .802 | 521.275 | 1.000 |
| Error | 671.121 | 129 | 5.202 | | | | | |
| Total | 442313.000 | 152 | | | | | | |
| Corrected Total | 3712.836 | 151 | | | | | | |

a Computed using alpha = .05

b R Squared = .819 (Adjusted R Squared = .788)

Results in Table 3 revealed that there is a significant indirect effect of attitudinal disposition on achievement striving behaviour through psychological wellbeing. The result further indicated that there was partial mediating effect of psychological wellbeing on attitudinal disposition and achievement striving behaviour ($R^2 = .819$; $F = 24.823$; $Adj. R^2 = .788$; $P < .05$), it was further observe that although attitudinal disposition and psychological wellbeing accounted for approximately 78.8% of the variance in achievement striving behaviour ($Adj. R^2$

$= .788$) the effect of psychological wellbeing is negligible (partial Eta squared $= .014$). Therefore the null hypothesis is hereby rejected meaning that, there is significant indirect effect of attitudinal disposition to good governance on achievement striving behaviour through psychological wellbeing.

Ho4: There is no significant indirect effect of attitudinal disposition to good governance on achievement striving behaviour through emotional intelligence

Table 4: Model summary of indirect effect of attitudinal disposition to good governance on achievement striving behaviour through emotional intelligence

Tests of Between-Subjects Effects

Dependent Variable: achievement striving

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. | Partial Eta Squared |
|-----------------|-------------------------|-----|-------------|--------|------|---------------------|
| Corrected Model | 3039.540(a) | 22 | 138.161 | 26.471 | .000 | .819 |
| Intercept | 237.791 | 1 | 237.791 | 45.560 | .000 | .261 |
| Emoti | 7.602 | 1 | 7.602 | 1.457 | .230 | .011 |
| Attid | 2712.726 | 21 | 129.177 | 24.750 | .000 | .801 |
| Error | 673.295 | 129 | 5.219 | | | |
| Total | 442313.000 | 152 | | | | |
| Corrected Total | 3712.836 | 151 | | | | |

a R Squared = .819 (Adjusted R Squared = .788)

Results in Table 4 revealed that there is a significant indirect effect of attitudinal disposition on achievement striving behaviour through emotional intelligence. The result further indicated that there was partial mediating effect of emotional intelligence on attitudinal disposition and achievement striving behaviour ($R^2 = .819$; $F = 24.750$; $Adj. R^2 = .788$; $P < .05$), it was further observe that although attitudinal disposition accounted for approximately 78.8% of the variance in achievement striving behaviour ($Adj. R^2 = .788$) the effect of emotional intelligence is negligible (partial Eta squared $= .011$). Therefore the null hypothesis is hereby rejected

Discussion

Attempt is made by this study to determine the mediating role of psychological wellbeing and emotional intelligence in attitudinal

disposition to good governance and achievement striving behaviour of Local Government political functionaries in Ogun State, Nigeria. This research work is anchor on the need to provide an empirical basis for psychological intervention in the improvement of the achievement striving behaviour of political functionary so as to sustain good governance and sustainable development. Results demonstrated that that there is a significant direct effect of attitudinal disposition on achievement striving behaviour independent of psychology wellbeing and emotional intelligence. By implication, attitudinal disposition is capable of influencing the criterion measure; and this has significant implication for for good governance and sustainable development. The most notable findings revealed that almost, 78.7% of the variance in the model is explained by attitudinal disposition to good governance of

the political functionaries; leaving about 21.3% as unaccounted factors that could also influence the achievement striving behaviour of political functionaries but not considered by this present study.

The high point of the findings is in the fact that there was a significant indirect effect of attitudinal disposition on achievement striving behaviour through psychological wellbeing and emotional intelligence. The result indicated that there was partial mediating effect of psychological wellbeing and emotional intelligence on attitudinal disposition and achievement striving behaviour ($R^2 = .819$; $F = 24.823$; $\text{Adj. } R^2 = .787$; $P < .05$), this implies that there is significant mediating effect of psychological wellbeing and emotional intelligence in the relationship between attitudinal disposition and achievement striving behaviour. The mediating effect of psychological wellbeing on the relationship between attitudinal disposition and achievement striving behaviour is stronger than the effect of emotional intelligence. Therefore the effect of the emotional intelligence is negligible (partial Eta squared = .011). The findings of this study further strengthen the argument of Lucas, (2003) who revealed that an individual high in psychological well-being reflects a dominance of positive over negative affect behaviour.

Also Tracy (2003), find out that attitude is a major reason behind every good and bad behaviour. He further explained that People strive to maintain "Cognitive consistence", that is a psychological balance between the three attitudinal elements: beliefs, feelings and actions, and between different attitudes. Attitude expresses an individual's orientation towards the organization by which he/she identifies with a particular organization and its goals and wishes to maintain membership in the organization (Ekenimoh, 2013). The results of this study also strengthen the findings of Moore & Keyes, (2003) who established that psychological well-being is said to be related to the people's emotional and cognitive evaluations of how well they feel and how functional they are, both personally and socially

Implication of Findings

The findings of this study underscore the need for the Nigerians to rise to the challenge of its

development, the governance of Nigeria must be practiced as enshrined in the constitution. Also The findings have revealed the practical relevance of the roles of psychological wellbeing and emotional intelligence in improving the relationship between attitudinal disposition and achievement striving behaviour of political functionary. The implication of this is that Without a positive change in attitudinal disposition of the political functionary marginal improvements cannot take the Civil Service to a perceptible and new level of productivity and development.

Nigeria as an independent nation has drawn various development plans which embraced in full the principles of good governance and national development. It was observed that, the problem with Nigeria's development is not the lack of plans and initiative but that of governance. Although provision have been made for effective national development, the governance is corrupt, inefficient, not responsive and therefore has been unable to deliver the benefits of good governance to Nigeria. with all this lapses, Development strategies earmarked for sustaining development must be pursued vigorously.

Further implication of the study is that the political office holder who wish to lead other people should be disciplined and display unquestionable loyalty to their civic responsibility, the electoral process right from the party level must be addressed to ensure true democracy. Potential political functionaries should be strictly screened by all the relevant agencies to ensure that only people of high reputation contest elections. Most people occupying political positions appear religious but lack the fear of God. Efforts should be made to ensure credible people who are conscious of the mortal nature of man and judgement of God, come to power.

Also corruption at all levels of the Nigerian society should be addressed more vigorously and rule of Law must Be enforced to ensure people become accountable. Nevertheless change is imperative for the structure. Therefore all the stakeholder in Nigeria politics and the judiciary should turn a new leaf and work hand in hand for sustainable development of our great country Nigeria.

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Administration of Records in Nigerian Tertiary Institutions: Way Forward

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Abstract

This paper examined the administration of records in Nigerian tertiary institutions. Record is the life wire of every school organisation. School records are legal documents, books and files containing important information on actions and events which are kept, stored and preserved in the offices for retrieval and effective administration when the need arise. The noted several problems are associated with the records keeping in Nigerian universities, polytechnics, Monotechnics and Colleges of Education which include: inadequate computer device, poor electricity supplies to power the facilities, poor internet facilities, poor storage facilities of files, fire outbreak, flooding, pest and rodents while records are kept at the mercy of rats and termites. The introduction of electronic records keeping will ensure that records are stored, preserved, retrieved, monitored and utilized appropriately for effective school administration. It is therefore recommended that government should provide adequate fund to procure computer devices, internet facilities, power supply and train administrative staff through organised seminar programme, workshops and conference for effectively and efficient administration of records when needed.

Keywords: *Administration, School, Records Keeping, Tertiary Institution*

Introduction

All over the world, records are essential document which could be in form of written, soft or hard copy for future reference or retrieval. Record keeping is the life wire of school administration while management of it would enhance a smooth running of Nigerian tertiary institutions. It involves an information, data, accounts, agreements, books, drawings, memos letters, magnetic disks, and micro-graphics which are relevant in the educational system. Owo (2014) posited that the usefulness of school records depends on their being accurate, complete and reliable. The school is a formal organization characterized with specific rules, regulations and hierarchy of authority in primary, secondary and tertiary institutions.

Tertiary institutions are set up to education after post-secondary education in the Universities, Monotechnics, Polytechnics and Colleges of Education with the purpose of inculcating proper values and promoting scholarship through teaching, researching and community services. However, tertiary institutions records could either be manual or electronic depending on the administrative strategies employed by the management. According to Akinwumiju and Agabi (2008), they include statutory and non- statutory records. Statutory records according to Adebayo, (2014) are those records required by law to be kept as a matter of routine to help in the administration of the school. The non-statutory records are those records that a school manager may consider vital for the day to day management of the school but are not

required by law to be kept by the school. However, School records could be kept manually or electronically. Manual records waste a lot of time, finance and manpower which affect tertiary institutions administration in the area of storage, preservation and records of accurate information to facilitate the teaching and learning process. School records are kept under lock and key or electronically by the administrators in the system. According to Ujah (2016) a good record contains all relevant details which are recorded or written accurately and honestly. However, Hanior (2016) posited that the person responsible for filling them should ensure that all the columns are accurately completed. It has been observed that administration of manual records keeping in Nigerian tertiary institutions bedeviled with inexperience personnel, lack of fund to procure facilities like computer, internet, electricity supply poor administration of records about the teachers and students can hinder the success of the whole system.

Therefore, electronic records keeping become an issue of great concern to all stakeholders in tertiary institution that include: Government, TETFund Manager, educational administrator and non-governmental organization parents, lecturers, student, Electronic records are computerized and automated version of the manual record keeping. It is a modern record keeping through the use of Information Communication Technology (ICT) gadgets. Thus, ICT is a major tool for managing and transforming educational sector with good administration. It involves uses of software package for processing of students registration, admission letter, result checking, curriculum design, time-table, staff and student attendance, scheme of work, course materials, newsletter and media dissemination, payment of school fees, staff recruitment, log book and so on. Such records are kept by the Registrar, Dean, Head of Department and Administrative staff. Therefore, Institutions dealing with man and his activities need records to discharge their duties efficiently. In other words, for effective administration of tertiary institutions records, there is need for principal officers or administrators to develop skill for keeping

accurate and up-to-date records about the school's activities, which will be useful for evaluating lecturers' job performance, recruitment, staff training and development, decision making as well as organizing other school programme. When E- School records are created, information will be stored, retrieved and utilized appropriately for implementation of management programme.

What are Institutional Records?

Institutional records are vital documents, books, files and electronic mails needed for smooth administration of the tertiary institutions. It is a legal documents, books and files containing important information on actions and events which are kept, stored and preserved for retrieval and smooth administration of the universities, polytechnics, Monotechnics and colleges of education when needed. Egwunyenga (2009) posited that not all information can be considered as records until they satisfy such characteristics, genuine and authenticity that is, the information that records give must be true, correct and original, records must be comprehensive, available, accessible and secured. These records include admission and withdrawer list, log book, time table, course prospectus, school diary, visitor book, punishment book, students' academic record/profile, certificate register, staff minutes book, staff record book, financial record book, cash book, stock book and so on. The relevance of these school records according to Ujah (2016) is they serve as a bank where vital and crucial information concerning both students and the school are deposited for future reference and retrieval.

Categorization of Institutional Records

Institutional records can be categorized into two: Statutory Academic Records and Non-Statutory Academic Records.

1. Statutory Academic Records: These records are required by law for academic and administrative routine of the tertiary institutions such as students Admission/withdrawals register; curriculum, syllabus/academic prospectus, module/semester course work; academic time table; academic calendar, logbook; visitor's book; staff movement book; certificate book, visitors book; school diary; marking guide, online course registration,

online lecture note, examination record sheet; academic profile/cumulative records, conference proceeding record, seminar record, query book, education edicts and regulation; National policy on Education booklet and so on.

2. Non-statutory Academic Records: These records are not required by law but necessary for smooth administration of tertiary institutions such as administrative records; cash book; stock book; school calendar; inventory book; staff minute book; school magazine; inspection or supervision report file; Confidential report forms; requisition book; records of physical development; duty roster book; year book; hand book; inventory book; health record book and fees register; year book, punishment book, disciplinary committee book, and announcement book.

Relevance of Records Keeping in Nigerian Tertiary Institutions

The relevance of statutory and non-statutory academic records includes the following:

- i. For information retrieval and utilization in future
- ii. To enhance and support school planning process
- iii. To serve as historical records for references
- iv. To provide knowledge on student academic performance
- v. To facilitate the school's financial administration
- vi. To provide basis for advisory and counselling services
- vii. To provide raw data that could be used by departments or Ministries of Education for planning.
- viii To enable the proper and adequate provision of guidance and counselling services to the students
- ix To help in the correct placement of students in classes
- x To help in the determination of the academic progress of the school through external and internal examination results
- xi To serve as evidence in case of litigation from parents by class attendance register (Ujah, 2016).

Administration of Records Keeping in Nigerian Tertiary Institutions

Administration is a process of implementing policies and programme of management towards achieving organizational goals and objectives. Administration of records evolves systematic process of planning, organizing, directing, coordinating and reporting of data for storage, preservation and retrieval of information for future records. The implementation of academic programme depends on information and records of data.

School records as essential documents, books and files containing relevant information on events which are kept and preserved in the school offices for future retrieval if need be. Recently, computer has been used to process most of school records which include student online admission and registration, student online class and attendance register, students online academic profile, staff online records, log book, inventory and so on. Durosaro (2002) posited that school records occupy strategic position which aid effective and efficient organization and administration of the school. Administration of records in tertiary institutions could be achieved through manual and electronic process. Electronic records involved application of scientific method for distribution, utilization, storage, retrieval, retention, protection and preservation of all information necessary for the school administration through the uses of computer devices and internet facilities. The purpose of electronic records administration is to preserved, store and retrieve information effectively and efficiently in the school when need arise. The administrative head of tertiary institution include Vice chancellor, Rector, Provost, Registrar, Bursar, Librarian, Deans and Head of department. The school administrator in Nigerian tertiary institutions often preoccupied themselves for planning, organizing, staffing, coordination and reporting of available human, material and financial resources to obtain maximum level of teaching and learning activities in the school system. When the tertiary institution administrators are able to manage the school's programme and other educational activities such as monitoring academic and non-teaching staff progress and performance, recommend

them for promotion, training and development for appropriate authority and motivate them accordingly through welfare schemes. Therefore, such administrator can be described as a good administrator.

However, data might become mixed up to the extent that retrieval may be difficult when needed. Adesina in Owo and Nweze (2014) posited that People don't preserve documents even personal documents such as pay slips, declaration of age, marriage certificates, receipts of payment made on school fees and even certificates are being poorly kept and lost.

Way Forward

Education law requires that every educational institution should keep essential records. These records are statutory records and non-statutory records. Some records are required by law while other records are not required by law, but which are kept because they provide a useful source of information for teaching, researching and community service. The findings of the study revealed that several factors pose problem to Nigerian tertiary institutions records which include: inadequate fund, poor electricity supply, poor storage facilities, fire outbreak, flooding, poor internet facilities, pest and rodents while records are kept at the mercy of rats, termites and weather other destructive elements. More so, another problem militating against tertiary institutions record administration is that, some administrators are not conscious of how to use computer, internet facilities and some modern storage facilities such as computer flash, disc, microfilm and microfiche. However, electronic records system would guarantee adequate reports on lecturer to student ratio, admission status, skills and performance management reports. Therefore, Record keeping is the life wire of school administration while management of it would enhance a smooth running of Nigerian tertiary institutions. However, both manual and electronic records of preserving information require planning, organizing, staffing, coordinating, reporting and budgeting for implementing school policies and programme. These findings corroborated with Ajayi (2001), Babalola (2002), Adeyemo (2006) and Egwunyenga (2009) who in their various

studies stipulated that effective management of school records depend on certain management procedure and function.

Conclusion

This paper concluded that application of electronic records would help to preserved, stored, retrieved and monitored vital information of the school on student admission, registration, academic profile, attendance register, academic programme, course work, visitor's information, staff record register, staff minutes records, academic calendar, school time-table, punishment record, school accounts book and education edict and regulation, National Policy on Education booklet. In addition, it can be concluded electronic records will assist tertiary institutions administrators to store, preserve, monitor and retrieve essential information needed about the school.

Recommendation

Based on the findings, the study recommended the following:

1. The school administrator should regularly monitor the available records in the tertiary institutions.
2. School records must be well protected and stored to avoid damages that might be caused by water, fire and insects.
3. For efficient and effective record keeping in tertiary institutions, the following equipment must be provided and made functional: internet, computers, e-mail, fax machines, and photo-copying machines, scanner and printers.
4. The head of various departments must be familiar with various filing systems and adopt the appropriate one at the appropriate time.

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Effect of Parents Kidnapping on the Academic Performance of Girl-Child Education in Government.

Day Secondary School Sayonti, LAU LGA, Taraba State, Nigeria.

By

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Abstract

The study examined the effect of kidnapping of parents on the academic performance of girl-child education in Government Day Secondary School, Sayonti Lau LGA in Taraba State., Nigeria. It specially identified the reasons for kidnapping of parents in the study area, examined the consequences of kidnapping of parents on academic performance of child-girl education and identified measures of curtailing kidnapping activities in the study area. Data were collected from 72 parents and students using purposive and random sampling techniques. The data were analysed using descriptive statistics such as mean and standard deviation, while t-test analysis were used to test the null hypotheses at 0.05 level of significance. The result revealed that, the reasons of kidnapping of parents in the study area are because of dirty politics (mean=3.58), illicit intercourse (mean=3.40) among others. The consequences of kidnapping parents on the academic performance of girl-child education indicated the following; sexual harassment (3.55), illiteracy (3.72) among others. The measures for curtailing kidnapping in the study area were revealed as; provision of job opportunities (3.61), dead penalty for offenders (3.40), and be vigilant (3.50) among others. The study concluded that kidnapping of parents have negative consequences on the academic performance of the girl-child education in the study area. Recommendations are made that; there is the need for proper re-orientation of social, religious, and environmental integration irrespective of tribes and languages and Taraba State Government to implement the dead penalty signed into law in order to prevent further occurrences.

Keywords; Kidnapping, Parent, Education, Girl-child, Taraba State, Sayonti

Introduction

Taraba State and especially Sayonti in Lau LGA is under a severe internal and external security threat as the threat has political, religion, economic, illiteracy and environmental colouration. Each of these dimensions has critically affected the stability of their educational system. The most worrisome in the present development is the kidnapping and killings all over the area. Report have it that almost on weekly basis of how kidnapers strategically attacked several communities and houses with sophisticated guns.

In recent times, the kidnapping of parents and displacing them of their farmlands and loss of their major source of livelihood is becoming unbearable, hence has influence on their children education. The recent ways of kidnapping in Taraba State and Nigeria as observed by Kasarachi (2016) in AJibefun

(2018) has disrupted socio-economic, religious, and educational activities, political instability and threatened the national unity in Nigeria. These extra-judicial killings have forced thousands of people to abandon their homes and farmlands for safety, also Melaiye, etal (2020) reported that between January and middle of May,2020 alone more than ten prominent indigene of Lau were kidnapped and their whereabouts unknown.

The trend of kidnapping is on the increase all over the world, global survey index (2014) reported that throughout 2014, men, women and children continue to be kidnapped in villages, raids and held as slaves by militants, women and girls suffered sexual violence by armed groups as reported by (Hazen and Horner, 2017) kidnapping continue to contribute to a climate of insecurity all over Nigeria State. The kidnapping of 250 girls in a Girls

secondary school in chibok Borno State in 2014 and many more by Boko-Haram represent the growing incidence of the kidnapping in Nigeria.

Inyang and Abrabasu (2013) defined kidnapping as the forcible seizure, taking away and unlawful detention of a person against his/her will. Fage and Alabi (2017) conceived kidnapping as forceful or fraudulent abduction of an individual or group of individuals for reasons ranging from economic, political and religious. Uman (2012) also defined kidnapping as the act of seizing and detaining or carrying away of a person by unlawful force or by fraud and often with a demand for ransom. It involves taking a person from their family forcefully without their consent with the motive of holding the person as a hostage and earning a profit from their family.

In this regard, kidnapping could be for a number of reasons such as getting monetary reward, political, religion among others. It is usually done for a motive or for oppressive intention, though the most common of which is collecting money from the family of the victims for a ransom for freedom.

Parents could mean one of the two persons from whom one is immediately biologically descended, a mother or father, or person who acts as a parent in rearing a child, a step-parent or adoptive parent. Usman (2012) defined academic achievement as the measures of students learning acquisition of certain skills at the end of teaching and learning activities, also Orokpo (2016) refers to achievements as the result of an examination written by the student which are often a reflection of the extent of learning.

Irrespective of the types of kidnapping and the motive for the perpetrators, the psychological and financial impact of the problem can be quite devastating. One common effect of the abduction which seemed memorably traumatic was the lack of contact for many parents with their children during the periods that they were away. This was often because the left behind parent did not know the children's where about hence, sexual abuse as a result of kidnapping that can expose the child to risk of contracting sexually transmitted diseases. Another guised form of sexual molestation of

kidnapped parents on girl-child is that the girl-child are often forced to marriage with older husbands. As reported by Clark (2004) the child brides are married to older, more sexually experienced men with whom it is difficult to negotiate safe sexual behaviours.

The negative psychological effects of being abducted are huge, especially for a child. Depression, anxiety, and post-traumatic stress syndrome may last a life time; also, in an area where the incidence of kidnapping is high, fear limits people's lives and actions. They will always move with caution as they do not know who the next target is. The rich surmount themselves with security quads because of their fear of getting kidnapped, hence, socio-economic activities, religious, evaluation of their children are at a stake.

The overall implication of kidnapping parent of a girl-child for sustainable socio-development is that the farming, economic, educational and welfare of their children seem to becoming fast deteriorating, also a substantial part of the state's budget will be spent on acquisition of weapons and animations so as to equip the securities to handle the situation, all these seem to have affected the girls- child education and the economy, the problems can be reduced when we become our brothers keepers, politically mature and tolerate one another.

There are several studies previously carried out on the kidnapping. Uzochkwu (2013) and Freenan (2016) studied the incident of kidnapping at the international level but limited it to child abduction. Also File Muriel (2013) investigated the problem of kidnapping but focussed on political kidnapping. Also Uzochukwu (2013) conducted a study on kidnapping and hostage-taking and narrowed it to southern Nigeria. These observations have drawn the attention of these researchers to assess the effect of parents kidnapping on the academic performance of a girl -child education in GDSS Sayonti Lau LGA.

The frequent occurrences of parents kidnapping appear to have left adverse negative effect on socio-economic and educational development of the girl-child education in the study area. In views of the above, the present study aims to assess the

effect of parents kidnapping on the academic performance of the girl- child education with the aim of solving the menaces. Specifically, the study sought to;

- i. Examine the reasons of parents kidnapping
- ii. Examine the consequences of parents kidnapping on the academic performance of the girl- child education and
- iii. Identify control reassures to prevent parents kidnapping.

Methodology

The study was conducted in GDSS Sayonti in Lau LGA, Taraba State. Lau is one of the 16 Local Government Area in Taraba State and they are predominantly farmers. Sayonti in Lau LGA bordered Adamawa State, the village had one each of private and government owned secondary school. The study area was chosen because of the presence of secondary schools and because of proximity, the area of the study was also chosen because it is the area that is mostly affected by the activities of kidnappers and. convenience for the researchers to collect data. The population of this study comprised of parents and students in the village. These farmers produce both crops and livestock.

Method of Data Collection

The data for this study were collected from the primary source using structured questionnaire. Secondary information was obtained from journals, seminars/conference proceedings and internet. The questionnaire was divided into session A; -Reasons of parents kidnapping, Section B; - Consequences of parents kidnapping on the academic performance of girl-child education and section C; Measures to curtail the activities of kidnapping of parents in the study area.

Sampling Procedure and Sample Size

Purposive and random sampling techniques were employed in the selection of the respondents, parents and the entire SS3 females' students were purposively selected due to their experience in the incidence

of kidnapping. Then, a total of 72 respondents comprising of 22 parents and 50 female students were randomly selected to form the sample size for the study.

Research Instrument

The research instrument was subjected to face validation by 2 experts. Each validator reviewed items, identify ambiguities and proffer solutions that improved the instrument. The reliability of the instrument was determined through trial testing using 30 structured questionnaires, it was randomly administered to 10 parents in Appawa area of Lau LGA, while the reliability of the instrument was determined using Cronbach alpha formula for the purpose of estimating the internal consistency of the instrument, the reliability of the test was found to be 0. 83.

Method of Data Analysis

Descriptive statistics such as mean and standard deviation were used to analyse the objectives of the study. Mean rating scale of 4 points with the response category for each items were assigned values as follows; Strongly agreed (SA) 4 points, agreed (A) 3points, strongly disagreed (SD) 2 points and Disagreed (D) 1 point. A 2.50 mean score was used as the bench mark for decision making. while the hypotheses were tested using t-test analysis. at 0.05 level of significance.

The study therefore determined reasons of kidnapping of parents, consequences and measures that can be used to curtail/reduce the activities of kidnappers in the study area. The study did not venture into herdsmen influence on farming activities.

RESULTS AND DISCUSSION

Data collected were analysed and the results presented. The presentation is based on the research questions and hypotheses

Research question one: what are the reasons of parents kidnapping in the study area? The data that answered this research question is presented on Table 1.

Table 1: Mean Rating and t-test Analysis of the Responses of Students and Parents on the Reasons of kidnapping parents (N=72)

| S/N | Description of items | X | STD | X1 | SD | X2 | SD2 | t-cal | t- | tab1 | t-tab2 | RMK |
|-----|----------------------|------|--------|------|------|------|-------|-------|-----|------|--------|-----|
| 1. | Dirty politics. | 3.58 | 1.051. | 3.39 | 3.51 | 3.51 | 81289 | 591 | 556 | 557 | NS | |
| 2. | Economic gain | 3.51 | 984 | | | | | | | | | |
| 3. | Illicit intercourse | 3.44 | 982 | | | | | | | | | |
| 4. | Marriage | 3.65 | 812 | | | | | | | | | |
| 5. | Slavery | 3.72 | 796 | | | | | | | | | |
| 6. | Revenge | 3.55 | 905 | | | | | | | | | |
| 7. | Religious | 3.33 | 1.267 | | | | | | | | | |
| 8. | Grapping land | 3.08 | 1.284 | | | | | | | | | |
| 9. | Money | 3.37 | 1.111 | | | | | | | | | |
| 10. | Rituals | 3.3 | 1.164 | | | | | | | | | |

Source; Field survey 2020

Table 1 presents the analysis of the opinion of the reasons of parents kidnapping on the academic performance of girl-child education. The mean ranges from 3.30-3.58 indicating that both the students and the parents are of strong agreement that the listed items in research question one and hypothesis are the reasons of kidnapping parents in the areas as illicit intercourse, revenge, religious among others. The implication is that the listed items above are the immediate reasons of kidnapping parents. Table 1 furthered reveals that the purposes of kidnapping parents were because of dirty politics (mean= 3.58), economic gain (mean= 3.51). Another major reasons of kidnapping parents are slavery (mean= 3.72), revenge (mean= 3.55) among others.

Hypothesis 1 presents a t-test of analysis of the opinion of students and parents on academic performance of girl- child-education

in GDSS Sayonti. The result of the t-test cal. is .591 denoting that there is no significant difference between the opinion of students and parents on the academic performance of girl- child-education. Thus, the null hypothesis 1 was accepted.

Findings from this study reveals that the major reasons of kidnapping parents are because of dirty politics, economic gain, illicit intercourse, grapping of land, money among others. This result agrees with Ajbefun (2018), Hazen and Horonler (2001) who listed dirty politics, sexual harassment, revenge among others.

Research question two; what are the consequences of kidnapping parents on the academic performance of girl- child-education in GDSS Sayonti

Data that answered research Question 2 is presented on Table 2

Table 2: Mean Rating and t-test Analysis of the Responses of students and parents of the consequences of kidnapping parents on the academic performance of a girl- Child-Education N =72

| S/N | Description of item | X | Std | X1 | SD | X2 | SD2 | t-cal | t-tab1 | t-tab2 | RMK |
|-----|-----------------------------|------|-------|-------|-------|-------|------|-------|--------|--------|-----|
| 1. | Sexual harassment | 3.65 | 719 | 3.585 | 3.492 | 3.513 | 7003 | -515 | .608 | .617 | NS |
| 2. | High drug Intake | 3.58 | .822 | | | | | | | | |
| 3. | Loss of life | 3.65 | 851 | | | | | | | | |
| 4. | High rate of illiteracy | 3.57 | 3.65 | | | | | | | | |
| 5. | Destruction of social group | 3.72 | .796 | | | | | | | | |
| 6. | Lack of trust | 3.72 | .796 | | | | | | | | |
| 7. | Fear | 3.51 | .054 | | | | | | | | |
| 8. | Depression | 3.79 | 1.111 | | | | | | | | |
| 9. | Anxiety | 3.07 | 1.324 | | | | | | | | |
| 10. | Drop out of school | 3.44 | 1.118 | | | | | | | | |

Source; Field survey, 2020

Table 2 revealed the statistics of the opinion of students and parents of the consequences of parents kidnapping on the academic performance of girl-child in GDSS Sayonti. Mean ranges from 3.65 to 3.44 this means that both the students and parents are of strong agreement on all the items listed on

research question two. The answer to research question 2 is that sexual harassment (mean= 3.65), high drug intake (mean= 3.58), illiteracy (mean= 3.57) among others serves as dare consequences on the girl- child-education in the study area. This will negatively affect

their academic performance, hence lack of adequate concentration in their studies

Hypothesis 2 presents a t-test analysis of the opinion of students and parents of the consequences of kidnapping parents on the academic performance of girl-child-education. Result of the t-test cal. is -515 this means that there is no significant difference between the opinion of students and parents on

Research Question Three: what are the measures that can be used to reduce the relevance of parent kidnapping in the study area? The data that answered research Questions 3 is presented on Table 3

| S/N | Description of item | X | Std | X1 | SD1 | X2 | SD2 | t-cal. | t-tab1 | t-tab2 | RMK |
|-----|-------------------------------|------|-------|-------|------|-------|------|--------|--------|--------|-----|
| 1. | Night journey be reduced | 3.37 | 1.174 | 3.567 | .586 | 3.613 | .576 | -270 | .788 | .787 | NS |
| 2. | Everybody be vigilant | 3.79 | .558 | | | | | | | | |
| 3. | visitors not be allowed in | 3.51 | .826 | | | | | | | | |
| 4. | Enter motor in the main park. | 3.44 | .823 | | | | | | | | |
| 5. | Job creation | 3.79 | .558 | | | | | | | | |
| 6. | Dead penalty for offenders | 3.72 | .590 | | | | | | | | |
| 7. | Politics should be friendly | 3.65 | .612 | | | | | | | | |
| 8. | Avoid greediness | 3.44 | .982 | | | | | | | | |
| 9. | Be religion tolerant | 3.79 | .558 | | | | | | | | |
| 10. | Be your brothers keepers | 3.44 | .1.05 | | | | | | | | |

Field survey: 2020

Table 3 reveals the statistics of the opinion of the students and the parents on the measures that can be adopted to reduce the activities of kidnappers in the study areas as; be vigilant (mean= 3.79), night journey be reduced (mean=3.37, enter motor in the main park (mean=3.44), and politics be friendly (mean= 3.65) among others. The implication is that both the students and the parents agreed on all the items listed.

Hypothesis 3 presents a t-test of analysis of the opinion of students and parents on measures that can be used to reduce the menace of kidnapping in the study areas. Result of t-test cal is -517, denoting no significance difference among the two groups, hence hypothesis is retained.

Finding from this study revealed that the kidnapping of parents can be reduced through avoidance of night journey, be our brother’s keeper, and dead penalty for offenders. The result agrees with Uzochukwu (2013)

Findings on hypothesis 1, 2 and 3 revealed that there is no significance

the above stated items. Thus, the null hypothesis 2 was accepted

The findings of this result also revealed that the major consequences of kidnapping parents include depression, fear, drop out and loss of life. The results agree with Alabi (2017), Melaiye, e tal (2020) and clark (2014) who opined that depression can led to frustrations, high blood pressure and if not check can lead to death.

Table 3: Mean Rating and t-test Analysis of the Responds of Students and Parents on the Measures that can be used to Halt the Activities of Kidnappers in the Study Area N=72

difference between the responses of the students and the parents on the influence of parents kidnapping on the academic performance of a girl-child in GDSS Sayonti. This finding agreed with Uzochukwu (2013), Ajibefun (2018) and Inyang and Abraham (2015) that the overall implication of kidnapping parent of a girl-child for sustainable socio-development is that the farming, economic, educational and welfare of their children will become deteriorated, also a substantial part of the state’s budget will be spent on acquisition of weapons and animations so as to equip the securities to handle the situation, all these seem to have affected the girls- child education and the economy.

Conclusion

The study explores the reasons, consequences and measures of parents kidnapping on the academic performance of girl-child education in GDSS Sayonti, in Lau LGA, Taraba State, Nigeria. It can be concluded that the reasons of parent kidnapping are because of dirty

politics, economic gains, religions intolerant and marriage among others. The consequences of kidnapping parents on academic performance of a girl-child education include among others as sexual harassment, high drug intake, illiteracy, drop out of schools, while measures to be taken include job creation, be religious tolerant, be your brother's keepers among others. It was further concluded that kidnapping parents and its aftermath effects and control measures on the girl-child education are not different.

Recommendations

- i. There is need for proper re-orientation of social, religions and environmental integration irrespective of tribes, religion or languages.
- ii. Taraba state government to implement the dead penalty signed by the State Governor.
- iii. The relevant security agencies especially the anti-kidnapping squad should be adequately equipped and funded to stamp out the kidnapping in Sayonti- Lau LGA

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School Location as A Factor in Secondary School Students' Achievements in Science in Ekiti State using Problem-Solving Instructional Strategy

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Abstract

The study examined the impact of school location on academic achievement of science students in senior secondary schools using problem-solving instructional strategy. The purpose was to determine whether the geographical location has any impact on the achievement of students in physics using the problem-solving instructional strategy. The study adopted a pre-test, post text control group quasi experimental design. The targeted population for the study comprised all the senior secondary school two [SS2] students offering physics in Ekiti State, Nigeria. A sample of 80 students drawn from four secondary schools were purposively selected and distributed to experimental and control groups. Two instruments namely: Teachers' Instructional Guide (TIG) and Physics Achievement Test (PAT) ($r=0.75$) were used were developed, validated and used to collected data. Two research hypotheses were formulated and analysed using 2-way ANOVA and t-test statistical analysis at $p<0.05$ level of significance. The findings showed that there was a significant difference in academic achievement of physics students in rural and urban areas using problem solving instructional strategy. The findings further revealed that there was no statistical significant different in the achievement mean scores of male and female students in the urban area. However it was recommended that the government should bridge the gap between the rural and urban location by providing the rural dwellers with relevant social amenities which will enhance better academic achievement of student in the rural areas.

Key Words: School location, achievement, problem-solving, science subject and physics.

Introduction

Evidences abound in our society that science and technology are not just tools but vehicles for all round development of a nation. It has become an indispensable tools that no nation either developed, underdeveloped or developing, wishing to progress in the socio-economic sphere will afford to relegate its learning in school. Science education is a distinct form of creative human activity which involves distinct way of seeing, exploring and understanding the

uniqueness of matters (Adesoji & Olatunbosun, 2008). Its importance cannot be over-estimated. The understanding of science helps man to know more about the universe without which it would have been impossible for man to explore the other planets of the universe. Science has expert a dominant role if not decisive influence, in the life of an individual as well as developmental effort of nation (Asikhia, 2010).

Despite the importance of science (Physics, Chemistry and Biology) and its educational

value which is relevant to the need of individual learners' economic and technological advancement of a nation and teachers' effort toward the realization of the noble objectives of science, the achievement of students in the subjects is not still encouraging. This is manifested in the poor achievement of the students in science subjects especially in physics in the West African Senior School Certificate Examination Results.

The factors affecting the teaching and learning science subjects as well as science students' poor academic achievement in science have been identified. These factors, according to Adebule & Aborisade, (2013), include class size, non-availability of instructional materials, instructional technique, gender inequality and location of schools.

Location of schools is a factor that could affect students' achievement in science subjects. In applying the school location planning to study and establishment of secondary level education in a pilot study in Ekiti state of Nigeria, Owoeye (2002) discovered that locations of schools was not based on sound principles of distribution of population because of initial community participation. Macmillan (2012) noted that school sites in the past were arbitrary chosen with little or no consideration for the necessary parameters such as creativity and corporate planning.

In another development, Madumere (1996) investigated the distribution of secondary schools in Imo state (Ohaozara local government area) employing locational planning techniques to carry out diagnostic and projection analysis on distribution of facilities in relation to education reforms and discovered among other things that there were imbalance or lopsidedness in the relationship between population density and distribution of secondary schools by local Government Area. Kolawole & Popoola (2011), in their studies on school location and academic achievement of secondary school in Ekiti State, Nigeria, assert that the various review of literature on school location influence on academic performance is not the same. While some maintain that urban students perform better in examinations than their rural counterparts,

others found that rural students inspite of all problems perform better. Some have submitted in their findings and concluded that no particular set up (urban or rural) can claim superiority over the other because their performance are the same.

However, location of school is just one factor out of many that can influence students' academic achievement, other factors such as instructional strategies adopted by the teachers can go a long way to influence students' achievement. The use of inappropriate method of teaching according to Azuka (2003) will go a long way to affect students' performance in Mathematics and other science subjects. According to the author, the problem of ineffective teaching and learning mathematics in Nigerian secondary schools have eaten deep to the very foundation of the nation's technological growth and need urgent surgical operation.

Similarly, findings from a study conducted by the curriculum development centre, Ministry of Education, Malaysia in 2002 as cited by Missilidine (2004), showed that students do not know how to interpret problems that involve pictures, stories and those which required students' creativity. As a result of this researchers has adopted many approaches to improve teaching and learning and to focus more technique on students creativity and active participation in classroom instructions. One of such approaches is problem solving instructional strategy.

According to Ogunyemi (2010), to achieve success in learning a particular concept, students should be given the opportunity to communicate using terms that have a direct relationship with the concepts and build up self-confidence in solving problems associated with the concepts. Simpson & Nist (2000) opined that a problem could be described as a stimulus for learning which requires an educational approach and not an isolated instructional technique. Hence problem-solving involved integration of concept and skill to get over the usual complete solution (Schommer-Akins & Dwell, 2005). Amosun (2002), noted that problem-solving is a systematic approach that reviews core competences (Comprehending, composing, critical and creative thinking). These features

are most important dimensions of thinking and learning. Problem-solving, according to Mahin (2009), involved systematic application of acquired knowledge to overcome any obstacle perceived by an individual as a problem. It refers to the efforts needed in achieving a goal. A problem solver needs to make use of relevant information, carry out some set of actions and logically think out the solution to the problem. Problem-solving strategy thus enables the students to be an active participant in the teaching learning process; where he think out solution to problems by himself while he is assisted by the teacher who only guides by giving hints or suggestion as the need arises.

Furthermore, Villa (2003) cited in Asubiojo (2015) identified the following steps in solving a problem:

- i. Identification of the problem that requires solution,
- ii. The problem should be well defined and delimitation prescribed,
- iii. Collection of relevant information that will help in solving the problem,
- iv. Analysis of the information (which lead to testing of hypotheses,
- v. Conclusion and application of results to new experiences (i.e. transfer of learning), and
- vi. Discussion of findings and summary,

Statement of Problem

Students, parents, educators, government and the populace are worried because of the poor achievement of students in sciences especially in physics. Physics as a subject has seriously become problematic making it difficult for many students seeking admission into the tertiary institution of learning to secure credit in it. Therefore the poor performance of students in the subject cannot be allowed to go unattended to. Factors which negatively affect students achievement in physics are many, but it seems the location of the students and the teaching strategy adopted by the teachers would go a long way to affect their achievement. Science teacher in Nigeria seem to employ teacher-centered strategies which had not improved students outcomes. Consequently there is need for evidence based strategies with the potential of

meeting the teaching and learning needs of both teachers and students in science. Teaching strategy such as problem-solving and other strategy which had improved students achievement in foreign countries seem not to have effectively applied in the teaching and learning of sciences in Nigeria. The study therefore seeks to investigate the strength and the weakness of the problem-solving strategy combined with others and the effect of location of students on their achievements using the strategy.

Purpose of the Study

The purpose of the study was to find out the relative effect of problem-solving and conventional method on students achievement. The study also sought to determine whether sex of the students has any influence on academic achievement when exposed to problem-solving instructional strategy. It also investigated the influence of school location on students' achievements when exposed to problem-solving strategy.

Research Hypotheses

Ho₁: There is no significant difference in the post-test mean scores using problem-solving and control group based on location.

Ho₂: There is no significant different between male and female students' achievement in physics located in the urban areas.

Research Method

The study adopted a pre-test, post-test experimental design. The target population for the study comprised all the senior secondary school two (SS2) students offering physics in Ekiti state Nigeria. A sample of 80 students drawn from four secondary schools were purposively selected and distributed to experimental and control groups. Two instruments namely: Teachers' Instructional Guide (IIG) a procedural instrument, and Physics Achievement Text (PAT) were used.

The Teacher's instructional guide (TIG) is an operational guide used as a procedural instrument for the experimental and control group. The TIG consist of the activities, behaviours and specific instruction guiding the teachers who instructed and supervised

students in the experimental and control groups. A problem-solving guide titled physics problem-solving model (PHYSOM) was developed by the researcher based on Petioles problem-solving model for the experimental group. The physics Achievement Test (PAT) consists of 40 -items multiples choice questions was designed and constructed by the researchers to measure students' achievement in physics.

The two instruments were validated by test experts and experienced Physics teachers. The reliability of (PAT) was determined using test -

Table 1: Two-way (ANOVA) summary showing difference between the post-test mean scores of problem-solving and control group in Physics based on location.

| Source | Sum of square (SS) | Df | Mean Square | f-cal. | f-table |
|------------------|--------------------|-----------|---------------|---------|---------|
| Corrected model | 21790.970 | 2 | 10890.49 | 704.09 | 3.15 |
| Group | 21780.970 | 1 | 21780.97 | 1408.00 | 4.00 |
| Location | 0.970 | 1 | 0.970 | 4.82 | 4.00 |
| Group & Location | 1.069 | 1 | 1.069 | 6.95 | 4.00 |
| Error | 21782.038 | 3 | 726.68 | 469.42 | 2.76 |
| Corrected Total | 1178.512 | 76 | 15.47 | | |
| Total | 22957.50 | 79 | 290.60 | | |

P < 0.05

The result of the analysis in table 1 shows that f-calculated (6.95) is greater than f -table (2.76) at 0.05 alpha level. This indicate that there was a significant difference in the post-

retest method and a reliability co-efficient of 0.75 was obtained. The data collected were analysed using 2-way ANOVA. The t-test of significant was used to compute the magnitude of the mean achievement for possible comparison of the two groups.

Results

Hypothesis 1: There is no significant difference in the post-test mean scores using problem-solving and control group based on location.

test means scores using problem-solving strategy in Physics based on location and hence the null hypothesis is rejected.

Table 2: Summary of Post-hoc Scheffe's test analysis showing post-test mean scores using problem solving and control in physics based on location.

| Mean | Variables Category | Group 1 rural | Group 2 urban |
|-------|--------------------|---------------|---------------|
| 40.29 | Rural | | * |
| 50.87 | Urban | * | |

The * value in the table indicates that there was a significant difference between the post-test mean score of Rural and urban mean using

problem-solving strategy with the urban area having the highest mean score of 50.87.

Table 3: Multiple Classifications Analysis (MCA) of post-test mean scores using problem-solving strategy and control groups in physics based on location

| Grand Mean = 48.43 | | | | | |
|-------------------------|----|----------------------|-------|--------------------------------------|------|
| Variable + category | N | Unadjusted Deviation | Eta | Adjusted for Independent + covariate | Beta |
| Urban | 50 | 16.50 | 0.213 | 16.50 | 0.01 |
| Rural | 30 | -16.50 | | -16.50 | |
| Multiple R ² | | | | | 0.94 |
| Multiple R | | | | | 0.97 |

The table 3 above presents the multiple classification analysis (MCA) using problem-solving strategy and the adjustment means scores of subjects i.e. (rural and urban). The results revealed that with the grand means of 48.43 urban students which has adjusted means scores of 65.33 i.e. (48.83 +16.40) performed significantly better than the

students in the rural areas which had an adjusted mean score of 32.33 i.e. (48.43+ (-16.50).

Hypothesis 2: There is no significant different between male and female students' achievement in physics located in the urban areas.

Table 4: t-test summary showing difference between male and female students achievement located in the urban areas.

| Source | N | Mean | Sd | Df | t-cal | t-table |
|--------|----|-------|------|----|-------|---------|
| Male | 24 | 65.79 | 1.89 | 38 | 1.41 | 1.96 |
| Female | 16 | 64.88 | 2.19 | | | |

The result in table 4 above indicates that the calculated t-value (t-cal) is less than the table value (t-table) at 0.05 level of significant. (i.e. $t\text{-cal} = 1.41 < t\text{-table} = 1.96, df = 38; p > 0.05$). This indicates that there is no significant difference between male and female students' achievement in the urban area using problem-solving instructional strategy. Hence the null the hypothesis is hereby accepted.

Discussion

Findings from the study showed that there was a significant difference in academic achievement of physics students in rural and urban areas with the students from urban area performing better than their rural counterparts, when taught with problem-solving instructional strategy. This is to say that the geographical location of schools has influence on the academic achievement of students. Perhaps this might be due to uneven distribution of resources, poor school mapping and problem of qualified teachers refusing appointment or not willing to perform well in isolated villages. This finding supports the earlier finding of Alokun (2010) who maintain that schools located in the urban areas achieved better than schools in the rural areas in science subjects. The finding also corroborates with that of Owoloye (2002) that school location, relief, drainage and soil vegetation as examined factors of geographical location of schools may collectively or singularly influence the students' academic achievement.

Furthermore, the result from data analysis shows that there was no significant difference

in the achievement mean scores of male and female physics students when taught with problem-solving strategy. The findings established further the homogeneity of male and female students in term of academic achievement irrespective of school location. However, this finding is in contract with the finding of Kolawole and Popoola (2011) who opined that sex has significant influence on students' achievement in mathematics in secondary schools.

Conclusion and Recommendations

In terms of location, the study has proven that students in urban areas had better academic achievement than their rural counterpart. In other words, students in urban location have a great advantage by learning in urban environment with relevant facilities.

Recommendations

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

The government should bridge the gap between the rural and urban location by providing the rural dwellers with relevant social amenities which will enhance better academic achievement of student in the rural areas.

In addition, the community should assist the government by providing social amenities and incentives for teachers posted to the rural area so as to encourage them to put in their best and to remain in their duty stations. Finally educators and other stakeholders should discourage gender stereotype in teaching and learning of physics and other

science subjects irrespective of the geographical school location.

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Effects of Constructivism Teaching Instructional Approach on Senior Secondary School Students' Performance in Chemistry in Ondo State, Nigeria

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Abstract

This study examined the effects of constructivism on students' performance in Chemistry in Ondo State, Nigeria. The purpose of the study was to examine whether the use of constructivism strategy will enhance the performance of students in Chemistry in Ondo State, Nigeria or not.

The study adopted the quasi-experimental pretest-posttest control group design. The sample for the study consisted of 160 Senior Secondary School two Science students selected from four schools across the three senatorial districts in Ondo State using multistage random sampling technique. Two groups were involved in the study; the experimental group and the control group. The students in the experimental group were exposed to constructivism strategy of teaching while the control group was taught with the conventional method of teaching Chemistry. The instrument used for the study was Chemistry Performance Test (CPT). This instrument was used to collect data for the study. Reliability index of 0.91 was obtained at 0.05 level of significance. . Mean, Standard deviation and graph were used to answer the research question while Analysis of Covariance (ANCOVA) was used to test the hypothesis. However, Multiple Classification Analysis (MCA) was used to identify the variable that contributed to the difference among groups.

The findings of the analysis showed that constructivism strategy have significant effects on students' Performance when compared to the group taught with the conventional method. Based on the finding, it was recommended that Chemistry teachers should employ constructivism strategy for teaching concepts in Chemistry at the Senior Secondary School levels. Curriculum planners should incorporates constructivism strategy in the Chemistry Curriculum of Senior Secondary Schools in Nigeria to aid participatory individualized and interactive learning among our students

Introduction

Science is important today and it is frequently used as a means of understanding the development of technology. Science is a field of human endeavor which seek to describe accurately the event and circumstances that exist or occur within man's natural environment. Science has become such an indispensable tool that no nation developed or developing,

wishing to progress in socio economic sphere will afford to relegate its learning in schools (Agbaje & Awodun, 2014). However, Science and technology would be incomplete without Chemistry. Chemistry is the study of the properties and transformation of matter.

Chemistry being one of the major Science subject offered at the Senior

Secondary Schools in Nigeria has a major role in this modern era of technology world-wide; it helps in the acquisition of appropriate Scientific and technological skills required to cope with the challenges presented by the evolving needs of modern work place in the industries (Ezeudu,2013). In addition, knowledge of Chemistry is required in the production of drugs, building materials, clothing materials and food preservations. Chemistry knowledge is needed in the field of engineering, pharmacy and medicine; hence, it is considered as “gate keeper” for future study of both pure and applied Sciences (Aderonke &Vitoria 2013).

According to Jegede (2007) Chemistry is a core Science subject which is compulsory not for all students but only to students in the Science class. It is one of the pre-requisite subjects for the study of medicine, pharmacy, biochemistry engineering and other Science and applied Science courses in the tertiary Institutions.

The teaching of chemistry in Secondary school in Nigeria has assumed increasing importance in recent years; and this is due to the important roles it plays in technological advancement of our contemporary society. The significance of chemistry has made it imperative for its inclusion in the Nigeria Senior Secondary School curriculum for science students. In spite of the importance of Chemistry as a requirement for many specialized fields in Science and engineering courses at the tertiary institutions and its contributions to the economic advancement of Nigeria as a nation, student performance at the Senior Secondary School level in Nigeria in Chemistry is not encouraging, as observed by the researcher. This ugly trend in Students performance might be due to poor teaching method adopted by science teachers.

The understanding of a subject by the students depends to certain extent on the method used by the teacher to teach the subject. However the common Instructional strategy used by teachers in teaching Chemistry at the Senior Secondary School levels as observed by the researcher is the lecture method. This method is dogmatic and does not allow for students active participation and as well; preventing students from mastering and comprehending concepts taught. Jegede (2016),submitted that a number of methods have been suggested which teachers may use in different teaching and learning situations for the effective realization of their instructional objectives ,these methods includes: discussion, lecture, demonstration, experimental and excursion, constructivism and laboratory method among others, but no particular one of these methods may be said to be the best, as a method that could be used to treat a topic may not be suitable to teach another topic in the same subject (Chemistry). However, Chemistry teaching becomes effective when the procedure involved learners active participation which guides the learner’s thinking, stimulates their imagination and influences their transfer of knowledge.

In other to realize the objective of effective teaching and learning of chemistry at Secondary School level, the researcher is of the opinion that, efforts should be geared towards shifting focuses away from the use of lecture method to a more modern and pragmatic method like “constructivism”

Constructivism is a theory propounded by Bruner in 1986. The theory state that, meaningful learning occurs when people actively try to make sense of the world when they construct interpretation of how and why things are by filtering new ideas and experiences through existing knowledge structures. Constructivist emphasize that individuals build new

meanings upon previous meanings that they have acquired through life experience (Petersen and Olsen 2000). It is believed by cognitive theorist that, teachers cannot take what is in their head and ploop that information into a students' head because the students' life experience are not identical to anyone else's including (and perhaps especially) the teacher's. it is interesting to us that the term "Virtual reality" is used to describe technologically simulated, artificial, three-dimensional environment that people can manipulate through bodily movement; stressed by Petersen.

Constructivist learning theory says that all knowledge is constructed from a base of prior knowledge. Children are not a blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions. Therefore, children learn best when they are allowed to construct a personal understanding base on experiencing things and reflecting on those experiences. Constructivism holds that knowledge is constructed, not transmitted; prior knowledge impacts learning process; initial understanding is local not global and building useful knowledge structure requires effortful and purposeful activities (Ogundola & Popoola, 2010).

In constructivist classroom, students work primarily in groups, learning and knowledge are interactive and dynamic. There is a great focus and emphasis on social and communication skills, as well a collaboration and exchange of ideas. This is contrary to the traditional classroom in which students work primarily alone. Learning is achieved through repetition and the subject are strictly adhere to and are guided by textbooks (Famuwagun, 2015). In constructivist class; the learners are actively involved, environment is democratic, activities are interactive and students centered and the teacher facilitates a process

of learning in which students are encouraged to be responsible and autonomous.

Meanwhile some teaching techniques encouraged in constructivist classroom are:

- Experimentation: students individually perform on experiment and then come together as a class to discuss the result.
- Research Project: students research a topic and can present their findings to the class.
- Field trips: this allows students to put the concepts and ideas discussed in the class in a real-world context. Field trips would often be followed by class discussions.
- Film: these provide visual context and thus bring another sense into the learning experience.
- Class discussion: this technique is used in all of the methods described above. It is one of the most important distinctions of constructivist teaching method (Wikipedia, the free encyclopedia).

The constructivist teaching method that is being considered in this study is demonstration method. Thus, demonstration method is described as a method that is designed to show or illustrate a procedure, process or phenomenon. Demonstrations in Science are effective and provide excellent learning experiences. Successful demonstration activities carried out in teaching process provide concrete experiences and can be used for structuring future information for students (Joshi, 2008). Demonstration, as a teaching strategy, refers to the visual presentation of the action and activities or practical work related to the fact and principles of a delivered lesson by the teacher in the classroom, aiming to facilities the tasks of teaching and learning. (Manga & Manga, 2014). It makes students active participant in teaching-learning process and provides the opportunities for the development of their mental faculties of observation, reasoning, deep thinking and creative

imagination. This (demonstration) teaching skills involves the teacher performing experiment before the class and meanwhile goes on asking relevant questions from the students. The students are compelled to observe carefully because they have to describe each and every steps of the experiment accurately and draw inferences. The students are questioned and cross examined concerning the problem at hand and their inferences are discussed in the class (Yogesh, 2007).

According to Adegbola (2016), demonstration method is a teaching strategy that involves experimentation. This method had shown to be effective with both large and small groups of students. The author submitted further that, demonstration method is effective in teaching Sciences and that its use helps the students to derive maximum achievement and also gave a deeper insight on Sciences thereby goes a long way in making Science lesson's interesting

Purpose of the Study

The purpose of the study was to identify the effects of constructivism teaching strategy on the performance of students in chemistry in Senior Secondary Schools specifically, the study seeks to find out whether the use of constructivism method would enable Senior Secondary School students attain more in Chemistry than the conventional methods.

Research Questions

Based on the statement of the problem and the background to the study discussed above, the following research question was raised.

- (1) What is the effect of constructivism on achievement of students in Chemistry?

Research Hypotheses

The following hypothesis was generated for the study

1. There is no significant difference between the performance mean scores of students

taught chemistry using constructivism Method of teaching and those in the control group.

Methodology

Research Design

This study adopted a quasi-experimental pretest/posttest control group design which examined the effects of constructivism on students' performance in Chemistry.

Population

The population for the study comprised all the Science students in Senior Secondary Schools II in 303 public Secondary Schools in Ondo State.

Sample and Sampling Techniques

The sample for the study comprised of 160 Senior Secondary School II (SSS II) students obtained from four schools across the three senatorial districts in Ondo State using multistage random sampling techniques. Intact class was used in each of the sampled schools.

Research Instrument

The Instrument used for the study was Chemistry Performance Test (CPT). It was used to measure the performance of students in Chemistry before and after treatment. It was a self constructed instrument containing 20 items drawn from the topic taught (Acid-base reaction).

Validity of the Instrument

Face and content validity of the instrument was ascertained by Chemistry teachers and experts in Science education. They examined and scrutinized the instrument; their suggestions were effected before the instrument was used.

Reliability of the Instrument

The reliability of the instrument was determined through test-retest method. This involved the researcher administering the instrument (CPT) twice within an interval of two weeks on 20 students who did not take part in the study. The two sets of scores obtained from the separate sets of responses were later collated and correlated using Pearson's Product Correlation Analysis. Reliability index of 0.91 was obtained. This value was regarded as high

enough to be used for the study at 0.05 level of significance.

Data Analysis

Data collected were collated and analyzed using descriptive statistics. The research question was answered using mean, standard deviation and graph. The hypothesis was tested using inferential statistics of Analysis of Covariance (ANCOVA) while Multiple Classification Analysis (MCA) was used to identify the

variable that contributed to the difference between the groups.

Results and Discussion

Question 1: What is the effect of Constructivism on the performance of students in Chemistry?

In order to answer the question, pre-test and post-test of students exposed to Constructivism Method and those in the conventional method of teaching were obtained. The result is presented in Table 1 and Figure 1 respectively.

Table 1: Mean scores and standard deviation of pre-test and post-test of Constructivism group and the control group.

| Groups | N | Pre-test | | Post-test | | Differences in Mean |
|--------------|----|----------|-------|-----------|-------|---------------------|
| | | Mean | SD | Mean | SD | Mean |
| Experimental | 80 | 19.95 | 10.10 | 75.44 | 9.85 | 55.49 |
| Conventional | 80 | 17.70 | 11.71 | 20.25 | 10.88 | 4.75 |



Table 1 shows that the pre-test mean scores of students in the Constructivism group (19.95) with standard deviation (10.10) was higher than that of the control group (17.70) with standard deviation of (11.71). The post-test means score of Constructivism group

was 75.44 with standard deviation of 9.85 while the control was 20.25 with a standard deviation of 10.88 respectively.

Figure 1 shows the bar chart of pre-test mean scores of students using Constructivism Method and the

conventional method of teaching in normal classroom teaching. Each bar represents the pre-test mean scores of students in the experimental and the control groups respectively. The pre-test mean scores of students in the experimental and control groups were relatively equal while the post-test mean scores of students in the experimental and control groups were significantly different as shown in Figure 1.

Hypotheses Testing: Hypotheses generated were tested using t-test, and analysis of covariance (ANCOVA).

Hypothesis 1: There is no significant difference between the Performance mean scores of students taught Chemistry using Constructivism Method of teaching and those in the control group.

Mean scores of students' Performance in Constructivism and control groups were obtained and compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result is presented in Table 2

Table 2: ANCOVA of students' achievement in Chemistry using Constructivism Method and Control groups.

| Source | SS | df | MS | F _{cal} | F table |
|---------------------|------------|-----|------------|------------------|---------|
| Corrected model | 12960.624 | 2 | 63480.312 | 839.597 | 3.04 |
| Covariate (pretest) | 5134.217 | 1 | 5134.217 | 67.906 | 3.89 |
| Group | 115464.528 | 1 | 115464.528 | 1527.145 | 3.89 |
| Error | 11870.470 | 157 | 75.608 | | |
| Corrected Total | 138831.094 | 159 | | | |
| Total | 505075.000 | 160 | | | |

*P < 0.05

Table 2 shows that F_{cal} (1527.145) was greater than F_{table} value (3.89) at 0.05 level of significance. Therefore, the null hypothesis was rejected. It shows that there was significant difference between the pre-test and post-test mean scores of students taught using Constructivism and those in the

control group. Hence, it is inferred that Constructivism Method of teaching has effect on students' performance when compared to their counterparts taught using the Conventional Method. In order to determine the pairwise difference among the groups, MCA was used. The result is presented in Table 5 as follows:

Table 3: Multiple Classification Analysis showing the achievement by treatment

| Grand mean= 47.84 | | | | | |
|-------------------------|----|------------------|-----|--------------------------------------|------|
| Variable +category | N | Unadjusted Devn' | Eta | Adjusted for independent + covariate | Beta |
| Constructivism | 80 | 16.84 | | 26.72 | |
| Control | 80 | -27.59 | .91 | -26.72 | .25 |
| Multiple R | | | | | .288 |
| Multiple R ² | | | | | .083 |

Table 3 shows that students exposed to Constructivism had higher adjusted post-achievement score of 74.56 (47.84+26.72) compared to those in the control group with an adjusted mean score of 21.12 (47.84+ (-26.72)). This implies that Constructivism is a veritable instructional method for enhancing students' achievement in Chemistry.

Discussion

The findings of the study showed that there was significant difference between the pre-test and post-test mean scores of students taught Chemistry using constructivism and those students that were exposed to the conventional methods of teaching Chemistry. This finding was in consonance with the conclusion made by Joshi (2008) that, demonstration in Science are effective and provide excellent learning experience and also that demonstration (a constructivist teaching strategy) provide concrete experiences and can be use for structuring future information for learners. The study also agreed with the submission of Adegbola (2016) that constructivism method like demonstration teaching skill is effective in teaching Sciences and helps the students to derive maximum achievement and as well gave a deeper insight on Sciences thereby goes a long way in making Science lessons' interesting.

Conclusion

Based on the data analysis and interpretation of the result, it was concluded that:

Constructivism Method of teaching is an effective and reliable method of teaching Chemistry. This method had the potentials of improving students' achievement and attitude in Chemistry than did the conventional Method of teaching chemistry at the senior secondary school levels.

Recommendations

Based on the findings and conclusion of the study, the following recommendations were made

- (1) Constructivism Method should be encouraged among Chemistry teachers so that teachers could built on the pre-existing knowledge and experience of the student in introducing new concepts to students in chemistry class.
- (2) Chemistry teachers should encourage students in their class to develop the act of constructing knowledge from their mind through their interaction with their environment.
- (3) Chemistry teachers should create a friendly atmosphere in such that an individual student in the class can have the courage to construct his/her own cognitive structure by engaging in hand-on activities.

- (4) Constructivism Method (like Demonstration Method) should be adopted by all the Chemistry teachers in Ondo State to teach chemistry at the senior secondary school levels because it has the capability to boost the students' achievement and as well develop positive attitude toward learning Chemistry.

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The Role of Agricultural Science Teacher Educators in Entrepreneurial Skills Development among Nigerian Youths

By

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Abstract

The study was conducted on the roles of agricultural science teacher educators in entrepreneurial skills development among Nigerian youths. Specifically, the study targeted students in tertiary institutions in Adamawa State. Three research questions and two hypothesis guided the study. Descriptive survey research design was used for the study, a structured questionnaire designed by the researchers was used to collect data from the respondents. The target population was lecturers and students of agricultural education departments in tertiary institutions in the state. The sample of the study was 30 agricultural science teacher educators and 50 agricultural science students. Mean and standard deviation was used to answer the research questions while t-test statistic was used to test the hypothesis at 0.05 level of significance. Findings from the study revealed that agricultural science teacher educators are responsible for imparting agricultural entrepreneurial skills to their students in tertiary institutions in Nigeria. The study recommended that agricultural education graduates should make proper use of their knowledge and skills in entrepreneurship to make them self-reliant through agricultural businesses.

Keyword: Agricultural science teacher educators, Entrepreneurial skills, Skills development, Agricultural value chain.

Introduction

No doubt, the rate of unemployment in Nigeria has become high as many youths leave school as graduates without any hope of getting a decent job. Agricultural education is a tool through which unemployment can be reduced greatly in Nigeria. According to Oke and Fabamise (2018), agricultural education is a systematic program of instruction available to students desiring about the science, business, technology of plant and animal production and/or about the environmental and natural resources systems. Agricultural education is designed to provide students with competencies to make them aware of and prepare them for the world of work.

Agricultural education is considered as one of the major tools of developing human resources in agricultural skills (Amadi and Nnodim, 2018). Agricultural education programmes provide instructions on crop production, livestock management, soil and water conservation and other aspects of

agriculture (Osinem, 2007). Agricultural education is composed of three different components according to Cajethan and Benardine (2015). These components include classroom instruction which takes place in the classroom setting, supervised agricultural experience which takes place in the field and future farmers' association which involves the development of leadership skills in agriculture. Agriculture has a wide variety of occupational areas ranging from on-farm to off-farm agricultural service occupations. The on-farm covers the farm occupational areas of crop production, animal production and fisheries culture and capture while the off-farm services refer to agricultural inputs and equipment manufacturing, processing and service occupations (Holly, 2019).

Teacher educators are those educational professionals who actively facilitate (formal) learning of student teachers and teachers. Teacher educators include educational researchers, managers and school

leaders who are responsible for the training and development of teachers. According to Swennen and Klink (2009), teacher educators are teachers, engaged in the induction and professional learning of future teachers through pre-service courses and / or the further development of serving teachers through in-service courses.

Agricultural Science teacher educators are experts in various fields of agriculture who are responsible for the training of youth aspiring to become Agricultural science teachers at various levels of education. Agricultural science teacher educators usually prepare teachers not just for the purpose of employment but also for self-reliance in various fields of agriculture, which ranges from crop production to animal production, as well as, agricultural value chain; which deals with the people and activities that brings basic agricultural products like maize or vegetables from production in the field to the consumer, through stages such as processing, packaging and distribution.

Entrepreneurship has a vast and different meaning to different people. Amesi (2015) views entrepreneurship as the ability to create self-reliance, self-employment and managerial ability for business enterprise. According to Hossain (2015), entrepreneurship means to undertake, to pursue opportunities, to fulfill needs and wants through innovation to undertake business. Shane (2007) presented a holistic view of entrepreneurship as an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organizing market processes and raw materials through organizing efforts that previously had not existed. Entrepreneurship is an individual's ability to turn ideas into action. It includes creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives. To, however be a successful entrepreneur, there is need for the individual to possess entrepreneurial skills.

Entrepreneurial skill is simply the necessary set of skills required to be an entrepreneur. It means the necessary skill an individual need to successfully run a business or add value to work (Oke and Fabamise,

2018). Nwobasi (2011) identified entrepreneurial skills to include management skills, job / technical skills, human relations skills, innovative / enterprising skills.

Entrepreneurship skills development among agricultural science teachers by teacher educators is a necessary tool for promoting spirit of entrepreneurship for self-employment and self-reliance. Anyadike, Emeh and Ukah (2012), observed that the need for entrepreneurship development in the country today is necessitated by the fact that entrepreneurship development is a major factor in economic growth and development and also the permanent solution for extreme hunger and poverty necessitated by unemployment.

Agricultural science teacher educators can facilitate the full participation of agricultural science teachers in training, to actively participate in entrepreneurship; which seems absent due to noticeable influx of young men and women to urban area for non-agricultural menial jobs. Most of the young people leave farming for other forms of jobs in cities. Hence the study sought to determine the role of agricultural science teacher educators in entrepreneurial skills development among Nigerian Youths.

Statement of the Problem

Youth unemployment in Nigeria has been on the increase, this problem is not just of school drop outs or those that did not attend school. It is a problem even for graduates of various programmes at various educational levels in Nigeria. Part of the problem includes inability of educational programmes to produce job creators and rather, producing graduates who migrate to urban area seeking a white collar job. Agricultural science teachers can be trained to be self-reliant but only when agricultural science teacher educators know their roles in giving such training and are effectively imparting knowledge, skills and attitude to agricultural education students at tertiary institutions in the State and Country at large.

Purpose of the Study

The main purpose of the study was to identify the roles of agricultural science teacher

educators in entrepreneurial skills development among Nigeria youths in Adamawa State. Specifically, the study sought to:

- i. Determine the demographic characteristics of agricultural science teacher educators in tertiary institutions in Adamawa State
- ii. Identify the roles of agricultural science teacher educators on entrepreneurship skills development of youths in Nigeria.
- iii. Determine the perception of agricultural science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development of youths in Nigeria.

Research Questions

- i. What are the demographic characteristics of agricultural science teacher educators in tertiary institution in Adamawa State?
- ii. What are the roles of agricultural science teacher educators on entrepreneurship skills development of youths in Nigeria?
- iii. What are the perception of agricultural science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development of youths in Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

HO₁ There is no significant difference between the mean responses of agricultural science teacher educators and agricultural science students on the roles of agricultural science teacher educators on entrepreneurial skills development of youths in Nigeria.

HO₂ There is no significant difference between the mean responses of agricultural

science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development of youths in Nigeria.

Methodology

The study used descriptive survey research design to seek the opinion of the respondents on the role of agricultural science teacher educators in entrepreneurial skills development among Nigerian Youths. The area of the study was Adamawa State. The state is located within the North-East Geo-Political zone, Adamawa State lies between latitude 7° and 11° North of the equator and 11° and 14° East (Adebayo & Tukur, 1999). The population of the study was all agricultural education lecturers in Modibbo Adama University of Technology Yola, Adamawa State University Mubi, Federal College of Education Yola and College of Education Hong and all the students in the department of agricultural science education in the four institutions. Simple random sampling technique was adopted to select 30 agricultural science teacher educators and 50 agricultural science students from the four institutions. The instrument for data collection was a structured questionnaire. The data collected were analysed, using mean and standard deviation to answer the research questions. The hypotheses were tested, using Z-test statistic at 0.05 level of significance.

Results and Discussions

The results of the study are presented in tables based on the research questions and hypotheses that guided the study.

Research Question 1: What are the demographic characteristics of agricultural science teacher educators in tertiary institution in Adamawa State?

Table 1: Demographic characteristics of Agricultural science teacher educators in Adamawa State.

| Variable | Frequency | Percentage |
|----------------------------------|-----------|-------------|
| Sex | | |
| Male | 22 | 73% |
| Female | 8 | 27% |
| Total | 30 | 100% |
| Educational Qualification | | |
| Ph. D. | 6 | 20% |
| Masters Degree | 18 | 60% |
| Bachelors Degree | 4 | 13% |
| HND | 2 | 7% |
| Total | 30 | 100% |
| Years of Experience | | |
| 0-5 Years | 6 | 20% |
| 6-10 Years | 10 | 33% |
| 11-20 Years | 6 | 20% |
| 21 Years and Above | 8 | 27% |
| Total | 30 | 100% |
| Area of Specialization | | |
| Agricultural Education | 10 | 33% |
| Agricultural Extension | 4 | 13% |
| Agricultural Economics | 4 | 13% |
| Animal Science | 5 | 17% |
| Crop Production | 4 | 13% |
| Microbiology | 2 | 7% |
| Management Science | 1 | 3% |
| Total | 30 | 100% |
| Rank | | |
| Technologist | 1 | 3% |
| Lecturer II | 14 | 47% |
| Lecturer I | 6 | 20% |
| Senior Lecturer | 6 | 20% |
| Chief Lecturer | 2 | 7% |
| Professor | 1 | 3% |
| Total | 30 | 100% |

From table 1 above, the result revealed that out of the 30 sampled agricultural science teacher educators, 73% of the respondents were male while 27% were female. This shows that there are more male agricultural science teacher educators than female. Considering the educational qualification of the respondents, there are more Master degree holders which made up 60% of the respondents and fewer HND holders with just 7%. Looking at their years of experience, it was divided into four categories with 0-5 years having 20%, 6-10 years 33%, 11-20 years with

20% and 21 years and above having 27% of the respondents. This implies that there are more agricultural science teacher educators with 6-10 years working experience than the other categories. On their area of specialization, those that read agricultural education have the highest percentage that is 33%, followed by those that read animal science with 17%. Findings also revealed that there are agricultural science teacher educators in departments of agriculture of vocational education that actually read courses that are not in the field of agriculture. Those that read

Microbiology made up 7% and Management sciences 3%.

Finally, the rank of agricultural science teacher educators was determined with lecturer II having 47% which implies that there are more lecturer II agricultural science teacher educators than any other rank.

However, the fewest from the results are professors and technologist with 3% each.

Research question 1: What are the roles of agricultural science teacher educators on entrepreneurship skills development of youth in Nigeria?

Table 2: Mean and standard deviation of respondents on the roles of agricultural science teacher educators on entrepreneurship skills development of youth in Nigeria

| S/N | Items | N | Mea n | Std. Dev | Remark |
|-------------------|---|-----------|-------------|-------------|---------------|
| 1. | Agricultural science teacher educators are responsible for imparting knowledge on agricultural value chain to their students | 80 | 3.57 | 1.74 | Agreed |
| 2. | Agricultural science teacher educators are responsible for imparting knowledge on agricultural opportunity identification to their students | 80 | 4.66 | 0.82 | Agreed |
| 3. | Agricultural science teacher educators are responsible for imparting knowledge on financial management to their students | 80 | 3.50 | 1.46 | Agreed |
| 4. | Agricultural science teacher educators are responsible for imparting knowledge on human and material resources management to their students | 80 | 4.66 | 0.54 | Agreed |
| 5. | Agricultural science teacher educators are responsible for imparting knowledge on agricultural product development to their students | 80 | 4.06 | 1.02 | Agreed |
| 6. | Agricultural science teacher educators are responsible for imparting knowledge on agricultural product marketing to their students | 80 | 4.41 | 0.96 | Agreed |
| 7. | Agricultural science teacher educators are responsible for psycho-productive skills development of their students | 80 | 3.98 | 1.13 | Agreed |
| 8. | Agricultural science teacher educators are responsible for encouraging their students to practice farming after graduation | 80 | 3.62 | 1.53 | Agreed |
| 9. | Agricultural science teacher educators are responsible for providing information on improved farming techniques to their students | 80 | 3.87 | 1.70 | Agreed |
| 10. | Agricultural science teacher educators are responsible for imparting knowledge on farm management skills to their students | 80 | 4.66 | 0.82 | Agreed |
| 11. | Agricultural science teacher educators are responsible for reducing the rate of unemployment in their students through proper training | 80 | 3.60 | 1.43 | Agreed |
| Grand Mean | | 80 | 4.01 | 1.20 | Agreed |

Data in table 2 showed the opinion of respondents on the roles of agricultural science teacher educators on entrepreneurship skills development of youth in Nigeria. The study revealed that agricultural science teacher educators are responsible for imparting knowledge on agricultural value chain to their students with a mean (3.75), they are also responsible for imparting knowledge on agricultural opportunity identification (4.66),

financial management (3.53), human and material resource management (4.66), agricultural product development (4.06), agricultural product marketing (4.41), psycho-productive skills development (3.99). Agricultural teacher educators are further responsible for encouraging their students to practice farming after graduation with a mean (3.63), they are also responsible for providing information on improved farming techniques

(3.86), farm management skills (4.66) and lastly, respondents agreed that agricultural science teacher educators are responsible for reducing rate of unemployment through proper training with a mean (3.60). Adams (2009) supported the findings by saying teachers are the driving force behind education and entrepreneurship. He further said teachers

inculcate entrepreneurial skills to their students.

Research question 3: What are the perception of agricultural science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development?

Table 3: Mean and standard deviation of respondents on the extent to which agricultural science teacher educators perform their roles on entrepreneurship skills development of youths in Nigeria.

| S/N | Items | N | Mean | Std. Dev | Remark |
|-------------------|--|-----------|-------------|-------------|-----------|
| 1. | Agricultural science teacher educators impart knowledge on agricultural value chain to their students | 80 | 2.25 | 0.54 | LE |
| 2. | Agricultural science teacher educators impart knowledge on agricultural opportunity identification to their students | 80 | 3.91 | 1.16 | ME |
| 3. | Agricultural science teacher educators impart knowledge on financial management to their students | 80 | 4.12 | 0.96 | HE |
| 4. | Agricultural science teacher educators impart knowledge on human and material resources management to their students | 80 | 3.96 | 1.11 | ME |
| 5. | Agricultural science teacher educators impart knowledge on agricultural product development to their students | 78 | 3.83 | 1.50 | ME |
| 6. | Agricultural science teacher educators impart knowledge on agricultural product marketing to their students | 80 | 3.87 | 1.70 | ME |
| 7. | Agricultural science teacher educators develop psycho-productive skills of their students | 80 | 4.66 | 0.82 | HE |
| 8. | Agricultural science teacher educators encourage their students to practice farming after graduation | 80 | 3.66 | 1.43 | ME |
| 9. | Agricultural science teacher educators provide information on improved farming techniques to their students | 80 | 4.16 | 0.54 | HE |
| 10. | Agricultural science teacher educators impart knowledge on farm management skills to their students | 80 | 3.91 | 1.16 | ME |
| Grand Mean | | 80 | 4.03 | 1.09 | HE |

From table 3 above, data revealed respondents are of the opinion that agricultural science teacher educators impart on agricultural value chain to a low extent with a mean (2.25). On imparting knowledge on agricultural opportunity identification, mean (3.91) was obtained, financial management (4.13), human and material resource management (3.96), agricultural product development (3.83), agricultural product marketing (3.87), psycho-productive skills (4.66). On the extent to which agricultural science teacher educators encourage their students to practice farming

after graduation has a mean (3.66), imparting knowledge on improved farming techniques (4.16) and lastly imparting knowledge on farm management skills (3.91). From the results above, it is evident that agricultural science teacher educators perform their roles on entrepreneurial skills development of their students to a high extent, though knowledge on agricultural value chain falls below the accepted level of 2.50. This implies that the agricultural science teacher educators impart little knowledge on agricultural value chain.

Hypothesis 1: There is no significant difference between the mean responses of agricultural science teacher educators and agricultural science students on the roles of

agricultural science teacher educators on entrepreneurial skills development of youths in Nigeria.

Table 4: t-test analysis on the responses of agricultural science teacher educators and their students on the roles of agricultural science teacher educators on entrepreneurial skills development of youths in Nigeria

| | OPINION | N | Mean | SD | SE | DF | t-cal | t-crit | Decision |
|---------------|------------------|----|-------|------|------|----|-------|--------|-----------|
| Roles. | Students | 50 | 39.36 | 3.57 | 0.51 | 78 | 0.42 | 1.96 | Accepted. |
| | Lecturers | 30 | 39.70 | 3.49 | .064 | | | | |

The result of the above table 4 showed that t-cal (0.42) was less than t-crit (1.96) at degree freedom (78) and 0.05 level of significance. This implies that the hypothesis which stated that there is no significant difference between the mean responses of agricultural science teacher educators and agricultural science students on the roles of agricultural science teacher educators on entrepreneurial skills

development of youths in Nigeria was not rejected.

Hypothesis 2: There is no significant difference between the mean responses of agricultural science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development of youths in Nigeria.

Table 5: t-test analysis on the responses of agricultural science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development of youths in Nigeria

| | OPINION | N | Mean | SD | SE | DF | t-cal | t-crit | Decision |
|--------------------|------------------|----|-------|------|------|----|-------|--------|-----------|
| Perception. | Students | 50 | 38.92 | 3.48 | 0.49 | 78 | 0.14 | 1.96 | Accepted. |
| | Lecturers | 30 | 39.03 | 3.61 | .066 | | | | |

Result from table 5 above revealed that t-cal (0.14) was less than t-crit (1.96) at degree freedom (78) and 0.05 level of significance. This implies that the hypothesis which stated that there is no significant difference between the mean responses of agricultural science teacher educators and their students on the extent to which agricultural science teacher educators perform their roles on entrepreneurial skills development of youths in Nigeria was also not rejected.

Conclusion

Based on the findings of the study, it was concluded that agricultural science teacher educators have a role to play in entrepreneurial skills development of youths in Nigeria. They are responsible for imparting agricultural

entrepreneurial skills to their students, and if the skills are properly imparted and properly utilized by the youths, it is capable of making them self-employed and even be employers of labour.

Recommendations

The study therefore recommended that:

1. Agricultural science teacher educators should intensify their effort in imparting knowledge on agricultural value chain to their students.
2. Agricultural education graduates should make proper use of their knowledge and skills in entrepreneurship to make them self-reliant through agricultural businesses.

3. Government should improve the funding of agricultural education programme in Nigeria.

4. Government should provide capital for agricultural education graduates to enable them start up business in agriculture.

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An appraisal of School Plant Adequacy in Public Secondary Schools, Ondo State, Nigeria

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Abstract

This paper appraised school plant adequacy in public secondary schools in Ondo State, Nigeria.. The study adopted descriptive research design of the survey type. Multistage, proportionate and purposive sampling procedures were used to select 85 secondary schools and 680 teachers used for the study. Two instruments were used for data collection: ASPDC and CSPDC. The instruments were subjected to both face and content validity by two experts in Educational Management and Tests and Measurement. Test-retest technique was used to determine the reliability of ASPDC and CSPDC and the reliability co-efficient of 0.78 and 0.84 were obtained for ASPDC and CSPDC respectively by using Pearson Product Moment Correlation analysis. Two research questions were raised to guide the study. The research questions were answered with descriptive (table, percentages and charts) statistics. Findings revealed that the school plant was inadequate in public secondary schools in Ondo State and the available ones were not in good condition. The study concluded that non-availability, inadequate and poor condition of school plant could be responsible for poor students' academic performance in the three senatorial districts of Ondo State. The paper recommended, among others, that there should be community participation in the provision and maintenance of school plant in Ondo State.

Keywords: Appraisal, School Plant, Adequacy, Public Secondary School, Ondo State.

Introduction

Education is a veritable tool for the development of human capital and a contributor to the sustainable economic, social and political development of a nation. Education provides the platform through which individuals acquire knowledge, skills and attitude that are necessary for effective living. Education in Nigeria is considered a social service. Secondary school education is an important level of education in the development of human capital and provision of life opportunities as it provides a linkage between basic education and the world of work in the first instance and further training on the other hand. Secondary education constitutes an investment in education that yields considerable social and private

returns. Quality education is predicated on the quality and adequacy of school plant which plays significant role in the achievement of educational objectives. It is on the basis of this that educational adequacy of school plant in Ondo State is appraised to find out their relevance to the secondary education curriculum.

Literature Review

The term school plant could refer to the school site, the buildings, the playgrounds, the equipment, material resources, secure, healthy and hygienic environment of the school for effective teaching and learning. According to Amanchukwu and Ololube (2015), school plant includes all permanent (site, buildings) and semi-permanent

structures: machines, equipment and the chalkboard while Momoh and Ofoegbu (2020) opined that school plant involves all the material resources in the school that facilitate teaching and learning. Uji (2019) however defined it as all those facilities that are built for and owned by an educational institution which aid the smooth teaching and learning experiences.

School plant is a supply or asset necessary for attaining educational objectives and effective teaching and learning processes. It refers to non-human and non-financial resources (Abdul Kareem and Fasasi, 2016). It also includes all movable and immovable materials, which are used for teaching, learning and other school activities. School plant incorporates operational input resources (buildings, ground, facilities and equipment) in the school system which is essential in the implementation of educational programmes and attainment of school goals (Ekpoh, 2018). It is the non-human resource that protects the physical and emotional well-being of the students and teachers from sun, rain and danger (Alimi, 2012).

The adequacy of school plant and teaching materials as well as their effective utilisation has been a major concern to educators. Studies from Asiyai (2010) have shown that the adequacy of school facilities have a strong effect on academic performance of students. The quality and quantity of educational facilities in an educational system positively correlate with the quality and standard of the educational system (Adesina, 1999, cited in Iheonunekwu, and Anyatonwa, 2014).

Many researchers, administrators and educational planners including Okyere-Kwakye, (2013) and Iheonunekwu and Anyatonwa, (2014) confirmed that school facilities in Nigerian schools are inadequate and the few available ones are being over utilised due to the astronomical increase in

school enrolment. Ikoya and Onoyase (2008) reported that only 26% of secondary schools across the country have school infrastructures in adequate quality and quantity. Further, Olasode (2018) found that the inadequacy and lack of optimal utilisation of school plant were major problems facing the Nigerian educational system. Deterioration of school facilities could cause setback for the teachers and students during teaching and learning. Deterioration has many negative consequences; they constitute health hazards to students and teachers who use the facilities. When the school buildings and equipment are left to deteriorate without maintenance, the large amount of money invested on school facilities could be wasted. Therefore, it could be argued that the availability, adequacy and maintenance of school facilities could enhance teaching and learning processes and may improve academic performance of students. Inadequate facilities is not peculiar to Nigeria as Kinuthia (2009), and Kiveu and Maiyo (2009), found that availability of educational resources in Kenya have been elusive since her independence..

In the same vein, Adediran, Ibrahim and Adelegun (2011) emphasised that the availability, relevance and adequacy of facilities such as classrooms, libraries, furniture apparatus and adequacy of instructional materials contribute to students' achievement. On the contrary, Gamoran in Owoeye and Yara (2010) concluded that facility and science laboratory had little impact on students' academic performance. Musau (2004) however found out that lack of library facilities was one of the most serious problems standing in the way of achieving high education standards in learning institutions whereas Maruf (2015) carried out a study on the students' utilisation of secondary school libraries and established

that availability of facilities had a direct link with the performance of learners in examination. In agreement with this finding is the studies made by Ayodele and Abiodun-Oyebanji (2007). In another study, Alimi, Ehinola and Alabi (2012) found that in South-West Nigeria secondary schools, instructional facilities such as classrooms, libraries, technical workshops and laboratories are grossly inadequate.

According to Oluwalola, Alabi and AbdulKareem (2014), teaching and learning do not take place in a vacuum but rather in a structured environment. The availability, relevance and adequacy of educational resource items are closely linked to adequacy of teaching/learning resources (Oluwalola et al, 2014). Moreover, Basil (2007) and Onotere (2008) have advanced reasons why most candidates find it difficult to pass their examinations. Such reasons include inadequate supervision, lack of adequate knowledge in various subjects, inadequate qualified teachers in schools and insufficient facilities. The insufficient facilities could over stretch the available school physical resources.

In this study, school plant was operationalised as: classroom; science laboratory; library and computer laboratory. Classroom is a shelter for both teachers and students that engage in the educative activities. It is a space bounded by the wall and roof in which a teacher houses his students for giving instruction to such students (Adeyemo, 2012). According to Alimi (2015), a good classroom is a base for all types of work, an art gallery, a museum, workshop and display center and exhibition area for education. Science laboratory could be described as a place where theoretical work is converted to form of observation, counting, measuring, experimenting, recording, and carrying out field work. Laboratory structure is essential to the teaching of sciences and the success of any

science course is much dependent on the laboratory provision made, its adequacy and their effective utilisation. Library buildings are established to advance the course of education. Library objectives are interwoven with that of education—they both aim at producing intellectually developed and complete individuals in the society (Maruf, 2015). According to Owoeye and Yara (2010), the educational role of the school library is to encourage reading habits and development of student's ability to learn from books. A computer laboratory could be defined as a room set up with a bunch of computers networked together for computer literacy. It is a space which provides computer services to a defined community (Wikipedia, 2019). Computer laboratories in secondary schools could be generally multipurpose. The laboratories may contain computers with hardware or software optimized for certain tasks or processes.

Public secondary schools in Ondo State are observed to be faced with combined challenges of deteriorating school plant and out-of-date design. The effects of this deteriorating condition of school plant are threats to school management, curriculum delivery and students' academic performance. Also, school enrolments are rapidly expanding consequence of which is overcrowding but the supply of facilities cannot meet up with the expansion in enrolment which makes some of the existing facilities to be over-stretched. A walk across schools in the State reveals abandon, dilapidated and uncompleted structures. It is based on this that it is very pertinent that the adequacy of the facilities in schools be investigated to determine their relevance to public secondary schools' curriculum in Ondo State, Nigeria.

Purpose of the Study

The purpose of this study was to:

1. determine the adequacy of available school plant in public secondary schools in Ondo State, Nigeria;
2. determine the condition of school plant in public secondary schools in Ondo State, Nigeria.

Research Questions

The following research questions were raised to guide the study:

1. How adequate are the school plants in public secondary schools in Ondo State, Nigeria?
2. What is the condition of school plant in public secondary schools in Ondo State, Nigeria;
- 3.

Methodology

The descriptive research of the survey design was used to carry out the study. . The descriptive survey type design is suitable because it afforded the researcher the opportunity to obtain the opinion of the respondents on school plant adequacy and condition. The population was made up of the 304 public secondary schools in Ondo State, Nigeria. The sample for this study comprised six hundred and eighty (680) teachers, selected from eighty-five (85) public secondary schools in Ondo State. A multi-stage random sampling technique was used to select the schools that were included in the study. This sampling technique was used because Ondo State has 304 public secondary schools that were not adequately represented in all the Local Government Areas. Also, the population size of the schools is very large and contains large number of units as senatorial districts, Local Government Area and school levels. The existing three (3) senatorial districts formed the first stage. The second stage involved proportionate selection of three (3) Local Government Areas which were drawn at 50% of the total number of Local Government Areas in each of the three (3) Senatorial districts in Ondo State. The third

stage involved proportionate selection of eighty five (85) secondary schools which were also drawn at 50% of the total number of schools in the selected Local Government Areas and purposive selection of 8 teachers from each school.

Two instruments were developed by the researcher for the study. The first instrument titled “Adequacy of School Plant Descriptive Checklist (ASPDC)” in which teachers were asked to fill quantity of school plant required and available in their schools. The second instrument titled “Condition of School Plant Descriptive Checklist (CSPDC)” seeks for the quality of the available school plant and was structured into a four-point Likert scale of Very Good Condition, Good Condition, Fair Condition and Bad Condition. The researcher constructed the checklists after careful review of some literature related to the study. The checklists consisted of two sections: A and B. Section A consisted of simple question on demographic data such as name of school, location, local government area and senatorial district while section B contained items related to school plant adequacy.

The face and content validity of the instruments were done by the experts in the Educational Management and Tests and Measurement. Their corrections and observations were incorporated into the final draft of the instruments. The reliability of the instrument (CSPDC) was carried out through test retest method and Pearson Product Moment Correlation analysis was used to calculate its reliability. A reliability coefficient of 0.84 was obtained thereby adjudged the instruments high reliability for the study.

Result

The results of the study are presented in line with the research questions as follows:

Research Question 1:

How adequate are the school plants in public secondary schools in Ondo State, Nigeria?

Table 1 (Appendix I) reveals the percentage score of school plant adequacy in the three senatorial districts of Ondo State. The highest mean percentage score in science laboratories, classrooms and computer laboratories adequacy was in Ondo South with 85.2%, 75.7% and 87.5% respectively. Ondo South had the highest mean percentage of 50.9% in library adequacy while Ondo North senatorial district had the least 43.8% of library adequacy. Also, Ondo North had the least score of 64.1% in science laboratories while Ondo Central had the least score (72.8%) in classrooms adequacy. The quantitative description of school plant adequacy is shown in figure 1 (Appendix II).

Research Question 2: What is the condition of school plant in public secondary schools in Ondo State, Nigeria?

Table 2 (Appendix III) reveals that the percentage mean value of very good condition and good condition of science laboratories were 0.9% and 13.9% while the percentage mean value of science laboratories in fair condition and those that are in bad condition were 43.1% and 42.0% respectively. The percentage mean value of classroom in very good condition and good condition were 6.6% and 10.4%, while the percentage mean value of classroom that were in fair condition and those that are in bad condition were 61.8% and 21.2% respectively. For libraries, 12.0% were found to be in good condition while 45.6% and 42.4% were in fair condition and bad condition respectively. The respondents further expressed that 8.1% of their computer laboratories were in very good condition, 19.2% were in good condition and that 45.9% and 26.8% were in fair condition and bad condition respectively. The results suggested that the four-school

plant need refurbishment in all the senatorial districts. To further show the condition of school plant, a bar graph (Figure 2) was used to describe the condition of the school plant (science laboratories, classrooms, libraries and computer laboratories) in Ondo State public secondary schools ((Appendix IV).

Discussion of Findings

It is apparent in table 1 that school plant was inadequate in the three senatorial districts. This finding concurred with that of Ayodele and Abiodun-Oyebanji (2007) who found that library and science laboratory building were grossly inadequate in South-West, Nigeria. It also agreed with Adediran, Ibrahim and Adelegun (2011) who found that school facility in the sampled secondary schools were inadequate. Furthermore, the findings of the present study buttressed the findings of Ikoya and Onayase (2008), and Iheonunekwu and Anyatonwa (2014) finding that found school facilities in Nigeria schools grossly inadequate. The inadequacy of school plant could be linked to some of the plant that are in state of disrepair, aging, obsolete and inability of government to provide permanent structures to meet the need of ever increasing students' population.

Table 2 shows the deplorable condition of available school plant in public secondary schools in Ondo State. The presence of bad and unused buildings in the secondary schools corroborates the finding of Ayodele and Abiodun-Oyebanji (2007) who found over 50% of the school building in their study in South-West, Nigeria in bad condition.. This finding disagreed with the findings of Asiyai (2010) that found good condition of school facilities in his own study. When the school plant deteriorates and are in bad condition, they constitute health hazards to students and teachers who use the plant. The deterioration of school

plant could also spell doom for the teachers and students during teaching and learning processes.

Conclusion

Based on the findings of this study, it was concluded that non-availability, inadequate and condition of school plant could be responsible for poor students' academic performance in the three senatorial districts of Ondo State.

Recommendations

The following recommendations are made for the improvement of teaching/ learning situation in Ondo State public secondary schools.

1. Ondo State government should eject more funds for the adequate provision of science laboratories, computer laboratories, classrooms, and libraries in secondary schools to improve teaching and learning activities cum students' academic performance. Dilapidated buildings should also be renovated and be put into effective use.
2. Centralized laboratories and libraries could be built in specific secondary schools for other schools within the vicinity to benefit.
3. Community participation in the provision and maintenance of school plant are recommended.

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Relationship between Teachers' Level of Information Communication Technology (ICT) Training and Usage of ICT for Teaching in Lagos State

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Abstract

The study investigated teachers' level of ICT training and usage of ICT for teaching in Lagos State. The descriptive research design was adopted for the study. Two hundred (200) participants (teachers) from six (6) senior secondary schools' out of 12 schools within Education District IV of Lagos was used for the study and all the sampled schools are with computer facilities. The participants were carefully selected through the method of stratified random sample from the entire population of 2,009 teachers in Education District IV of Lagos State. The instrument used for the study was titled Teacher's ICT Training and Usage of ICT Questionnaire (TLITUIQ) and was based on a four-point Rensis Likert Rating Scale. A research question was raised and answered while one hypothesis was formulated and tested at 0.05 level of significance. The hypothesis was tested using Pearson Product Moment Correlation, Analysis of Variance and t-test statistical tool at 0.05 level of significance. The result from the findings showed that there was a significant relationship between teachers' ICT training and usage of ICT for teaching in Lagos State. It was recommended that there is need for training and re-training of teachers especially the older ones to integrate them into effectively into the digital literacy era for effective teaching and learning.

Keywords: Teachers, ICT Training, ICT Usage

Introduction

The application of ICT resources in school no doubt can motivate students, stimulate their interest, increase their self-confidence and self-esteem, increase their creativity, allow greater interactivity, enhance their critical thinking and increase their attainments among other benefits. Usage of ICT can also enhance teacher s efficiency and enthusiasm, encourage their planning and cooperation, help them adopt student-centered teaching strategies, reduce their workload, and improve the relationship between teachers and students. Educational research has clearly pointed out that the use of ICT by teachers are crucial determinants of the way ICT is adopted and used in the classroom (OECD 2001). The integration of ICT in teaching and learning process benefits both students and teachers, whereas the worth of its implementation depends on teacher s readiness. In this perspective, the existence and availability of ICTs as such should not affect student learning and achievement, but its impact depends on

whether and how the new technologies are integrated and used in the teaching and learning process.

The Federal Government of Nigeria in the National Policy on Education recognizes the prominent role of ICTs in the modern world and has integrated ICTs into education in Nigeria (Adomi and Kpangban, 2010). To actualize this goal, the document states that government will provide basic infrastructure and training at the primary school. At the junior secondary school, computer education is made a pre-vocational elective and is a vocational elective at the senior secondary school (FRN, 2013).

For the purpose of this study, teachers level of ICT training as necessity for easy access to usage of ICT for effective teaching and learning was considered. Therefore, for teachers to effectively make use of ICT resources in the classroom, they must have better understanding of various types of ICT resources.

Accessibility and versatility are factors that can influence the use of ICT resources by classroom teachers. The level of teachers capacity on ICT would determine whether a teacher would use ICT resources for teaching or not. It is expected that if teachers find it easy locating ICT resources the tendency to use such resources is high and vice versa.

Training in Computer and Usage of ICT

Professional development of teachers is at the heart of any successful technology and education program. Teachers professional development is a key factor to successful integration of computers into classroom teaching. Many school leaders perceive the lack of ICT related knowledge of teachers as one of the main impediments to the realization of their ICT related goals (Pelgrum et al, 2003). One of the pertinent factors contributing to the usage of computer is that teachers need to be computer literate and thus be given appropriate training in computer usage (Ropp, 1999).

There are different views about computer literacy. A literal interpretation of computer literacy regard writing and reading computer programs as the basic skill of a computer-literate person. Training too plays an important role in a teacher s readiness to use computers. With regards to having attended formal computer courses, it was identified through numerous studies that there is a significant relationship between usage of computers and computer training (Wong, 2008).

Venezky (2014) found that professional development was one of the most important support in most schools for ICT integration into teaching as it has the greatest impact on the beliefs and practice of teachers and yet professional development time was not budgeted for in many schools in the study. Sandholtz and Reilly (2004) claim that teacher s technology skills are strong determinant of ICT integration, but they are not conditions for effective use of technology in the classroom. They argue that training programs that concentrate on ICT pedagogical training instead of technical issues and effective technical support, help teachers apply technologies in teaching and learning.

Teachers need to be given opportunities to practice using technology during their teacher training programs so that they can see ways in which technology can be used to augment their classroom activities. Teachers are more likely to integrate ICT in their courses when professional training in the use of ICT provides them time to practice with the technology and to learn, share and collaborate with colleagues. Similarly, research has shown that teachers require expert in technology to show them the way to integrate ICT to facilitate students learning (Plair, 2008). Teachers understanding of content knowledge and how to apply technology to support students learning and attainment are joined to their increase in knowledge level, confidence and attitudes towards technology. Educators who integrate technology with new teaching practices gained through professional training can transform the performance of the students (Lawless & Pellegrino, 2007).

According to (Chen, 2008), professional training courses must be designed to identify beliefs about successful teaching, policies for enhanced teaching and learning and syllabus design for teaching purposes. Teachers who are committed to professional development activities gain knowledge of ICT integration and classroom technology organization (Wepner, Tao and Ziomek, 2006). Clearly, it is imperative to allow teacher trainees to apply ICT in their programs when in school in order to be able to use the technology to supplement their teaching activities. It is most likely that teachers will integrate the technology into their teaching if given time to practice with the technology, learn, share and collaborate with their peers. Training programs for teachers that embrace educational practices and strategies to address beliefs, skills and knowledge improve teachers awareness and insights (Levin and Wadmany, 2008).

Training makes a positive difference to those who receive it. Angers and Machtmes (2005) state that teachers who receive eleven or more hours of curriculum-integration training are five times more likely to say they believe they are much better prepared to integrate technology into their classroom lessons than teachers who received no such training.

Teachers receiving more training of either type, but especially of integration training, are more likely to use software to enhance instruction in their classrooms. The empirical findings provided an insight that the variable training in computer usage has a positive impact on Actual Usage of Computer (AUC). The number of computer skills acquired by teachers, its being current, and the number of hours of formal training play an important role in positioning the AUC of teachers in a higher level. When teachers are being trained, the expertise expected increases in competence. It was realized that being skilled in ICT does not improve teachers' classroom teaching efficiency (Yuen & Ma, 2002).

Teachers professional development is a key factor to successful integration of computers into classroom teaching. Several studies have revealed that whether beginner or experienced ICT related training programs develop teachers' competences in computer use (Bauer and Kenton, 2005; Franklin, 2007; Wozney 2006), influence teachers' attitudes towards computers (Hew and Brush, 2007; Keengwe and Onchwari, 2008) as well as assisting teachers reorganize the task of technology and how new technology tools are significant in student learning (Plair, 2008). Sandholtz & Reilly (2004) claim that teachers' technology skills are strong determinant of ICT integration, but they are not conditions for effective use of technology in the classroom. They argue that training programs that concentrate on ICT pedagogical training instead of technical issues and effective technical support, help teachers apply technologies in teaching and learning. Research studies revealed that quality professional training program helps teachers implement technology and transform teaching practices (Brinkerhoff, 2006; Diehl, 2005).

Lawless and Pellegrino (2007) claim that if training program is of high quality, the period for training lasts longer, new technologies for teaching and learning are offered, educators are eagerly involved in important context activities, teamwork among colleagues is improved and has clear vision for students attainment. Teachers may adopt and integrate ICT into their teaching when training

programs concentrate on subject matter, values and the technology.

Similarly, research has shown that teachers require expert in technology to show them the way to integrate ICT to facilitate students learning (Plair, 2008). Teachers understanding of content knowledge and how to apply technology to support students learning and attainment are joined to their increase in knowledge level, confidence and attitudes towards technology. Educators who integrate technology with new teaching practices gained through professional training can transform the performance of the students (Lawless & Pellegrino, 2007).

The barrier to ICT integration most frequently referred to in the literature is lack of effective training. One finding of Pelgrum's (2013) study was that there were not enough training opportunities for teachers in the use of ICTs in a classroom environment.

Recent research in Turkey found that the main problem with the implementation of new ICT in science was the insufficient amount of in-service training programs for science teachers (Özden, 2007) and Toprakci (2006) concluded that limited teacher training in the use of ICT in Turkish schools is an obstacle. According to Becta (2004), the issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of the training. These were time for training, pedagogical training, skills training, and an ICT use in initial teacher training.

Correspondingly, recent research by Gomes (2005) relating to science education concluded that lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom, and lack of training concerning the use of technologies in science specific areas were obstacles to using new technologies in classroom practice. Some of the Saudi Arabian studies reported similar reasons for failures in using educational technologies: the weakness of teacher training in the use of computers, the use of a "delivery" teaching style instead of investment in modern technology (Alhamd, Alotaibi, Motwaly, and Zyadah, 2004), as well as the shortage of teachers who are qualified to use the technology confidently (Sager, 2001).

Providing pedagogical training for teachers, rather than simply training them to use ICT tools, is an important issue (Becta, 2004). Cox, (1999a) argue that if teachers are to be convinced of the value of using ICT in their teaching, their training should focus on the pedagogical issues. The results of the research by Cox, (1999a) showed that after teachers had attended professional development courses in ICT they still did not know how to use ICT in their classrooms; instead they just knew how to run a computer and set up a printer. They explained that this is because the courses only focused on teachers acquiring basic ICT skills and did not often teach teachers how to develop the pedagogical aspects of ICT.

However, beside the need for pedagogical training, according to Becta (2004), it is still necessary to train teachers in specific ICT skills. Fundamentally, when there are new tools and approaches to teaching, teacher training is essential if they are to integrate these into their teaching (Osborne & Hennessy, 2003).

Similarly, Sicilia (2005) found that teachers want to learn how to use new technologies in their classrooms but the lack of opportunities for professional development obstructed them from integrating technology in certain subjects such as science or maths.

Pre-service teacher education can also play a significant role in providing opportunities for experimentation with ICT before using it in classroom teaching (Albirini, 2014). Lack of an ICT focus in initial teacher education is a barrier to teachers use of what is available in the classroom during teaching practice (Becta, 2004). Bingimlas (2009) in his research findings noted teachers have a strong desire for the integration of ICT into education but that they encountered many barriers to it. The major barriers were lack of confidence, lack of competence, and lack of access to resources. Since confidence, competence and accessibility have been found to be critical components for technology integration in schools, ICT resources including software and hardware, effective professional development, sufficient time, and technical support need to be provided for teachers. No one component in itself is sufficient to produce good teaching.

Nyambane and Nzuki (2014) in their study observed that on the school level, factors such as professional development, accessibility of ICT resources, leadership and technical support facilities influence teachers adoption and integration of technologies into their classrooms. Teachers professional development is a key factor to successful integration of computers into classroom teaching. ICT related training programs develop teachers competences in computer use (Bauer & Kenton, 2005).

Statement of the Problem

The yearnings of many government is to transit from the analog era into the digitalize era for teaching and learning in schools. No doubt many schools were supplied computers gadgets courtesy of the various government spear-headed initiatives, development partners and individual schools. Apart from the provision of computer gadgets, Lagos State Universal basic Education Board has been involved in series of training programmes for all teachers in the state among which is the usage of ICT for teaching and learning in schools. However, the pace of ICT integration by teachers for teaching in Nigerian secondary schools has not been encouraging. Secondary school teachers are still rooted in the traditional instructional forms and as a result they are not making the necessary efforts to integrate ICT in teaching. Based on this, the study tries to investigate the relationship between teachers level of ICT training and their usage of ICT for teaching in schools using Lagos State as a case study.

Research Questions

This research question was raised to guide the study:

- What is the relationship between teachers level of ICT training and their usage of ICT for teaching in Lagos State?

Research Hypothesis

This hypothesis was formulated to guide the study

- There is no significant relationship between teachers level of ICT training and usage of ICT for teaching in Lagos State.

Purpose of the Study

The general purpose of this study is to investigate teachers' level of ICT training as determinant of their knowledge in the usage of ICT in Lagos State. Specifically, the study sought to: examine the relationship between teachers' level of ICT training and usage of ICT for teaching in Lagos State.

Significance of the Study

This study will be of immense benefit to teachers, school authorities and educational stakeholders. Specifically, the study would enhance the integration of ICT into learning processes and improve overall confidence attitude towards usage of computer application for teaching and learning. In addition, Lagos State Universal Basic Education Board (LSUBEB) under the UBEC Intervention funds has been involved in a lot of capacity development programmes for teachers in which the Training on ICT usage in school by the teachers is prominent. The study will assist to ascertain value for money in respect of this huge investment in training teachers on ICT usage in schools and at the same time to ascertain the coverage of this training to teachers.

Research Design

The descriptive survey research method was adopted for the study. This method is used because of its power to describe the interrelationship among variables. Descriptive research is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation (Osuala, 2004). The method involved survey which describes the status quo, the correlation study which investigates the relationship between variables, to developmental studies which seek to determine changes over time.

Population

The population of the study comprised all 2,009 teachers in 73 public secondary schools in Education District IV of Lagos State.

Sample and Sampling Technique

The teachers were selected through stratified and simple random sampling technique.

Educational District IV was divided into three zones namely: Apapa, Surulere and Lagos Mainland. Thereafter, purposive sampling was used to select schools with computer facilities and two secondary schools were sampled from each zone totalling six from whole district. Thirty (30) teachers were later selected from each school from Apapa and Surulere zones while 40 teachers were selected from each school from Lagos Mainland using stratified random sampling. A total of 200 teachers were randomly selected from Education District IV based on the following Apapa and Surulere zones (120 teachers) and Lagos Mainland (80 teachers). This forms 10% of the total population and is considered good for the study.

Instrument

A self-developed questionnaire entitled "Teacher's Level of ICT Training and Usage of ICT Questionnaire (TLITUIQ)" was used as research instruments to collect the needed information from the participants. The questionnaire was divided into sections A and B.

Section A elicited information relating to the demographic data of the participants. Section B had 5 items that sought answer to research questions raised by the researcher and the participants were instructed to tick the most appropriate. The instrument adopted a four Likert scale rating, which are Strongly Agreed (SA), Agreed (A), Strongly Disagreed (SD) and Disagreed (D) was the format of the questionnaire.

Validity of Instrument

The research instrument (questionnaire) was distributed by the researcher was submitted to the researcher's supervisor and an expert in the Department of Educational Management for verification, assessment and correction. The supervisor's suggestions were incorporated into the final draft of the questionnaire.

Reliability of the Instrument

A pilot study was conducted in order to ascertain the degree of reliability, consistency, stability and accuracy of measurement of the instrument. The study was carried out by

randomly selecting 20 teachers from two schools within District II (CMS Grammar school and Evans Adelaja). The score of the tests was computed using Cronbach Alpha to determine the reliability coefficient of the study. Reliability co-efficient of 0.81 was obtained and considered good for the study.

Administration of the Instrument

The questionnaires were administered to the randomly selected teachers in their various schools after obtaining a permission from their principals. The questionnaires were administered personally and were collected immediately in order to reduce any loss.

Procedure for Data Analysis

A frequency distribution table was created from the collected data. The percentage method analysed the respondents bio-data. Mean and standard deviation were used to answer the research question. The Pearson Product Moment Correlation statistical tool was used in testing hypothesis at 0.05 level of significance.

Data Presentation

Research Question: What is the relationship between teachers level of ICT training and their usage of ICT for teaching in Lagos State?

Table 1: Teacher’s Level of ICT Training and usage of ICT for teaching in Lagos State

| S/N. | Items | Agree (SA+A) | Disagree (SD+D) | Mean |
|-------------------|---|-----------------|--------------------|-------------|
| 1. | Continuous training and practice will improve teachers knowledge and usage of ICT | 200 (100%) | - | 3.79 |
| 2. | Training in the integration of ICT for teaching will improve my effectiveness in teaching | 180 (90%) | 20 (10%) | 3.21 |
| 3. | My school board did not allow or organize training for teachers on ICT usage. | 157 (78.5%) | 43 (21.5%) | 3.12 |
| 4. | Most of teachers in my school are not trained on how to use ICT tools | 150 (75%) | 50 (25%) | 3.03 |
| 5. | ICT training should be makes compulsory for all teacher. | 198 (99%) | 2 (1%) | 3.73 |
| Grand Mean | | | | 3.38 |

Source: Field Survey, 2019

With the use of a 4-point Likert scale type, the expected average (mean) response per item should be 2.50 (either in favour or disfavour of what is being measured).

Table 1 shows that all the participants agreed that continuous training and practice will improve teachers knowledge and usage of ICT with the mean score of 3.79>2.50 exceeding the statistical benchmark set. In the same vein 180 (90%) of the participants agreed and 20 (10%) disagreed that training in the integration of ICT for teaching will improve their effectiveness in teaching with the mean response 3.21>2.50 above the benchmark set. Likewise, 157 (78.5%) of the participants agreed while 43(21.5%) of the participants disagreed that their school board did not allow or organize training for teachers on ICT usage with the mean value 3.12>2.50 higher than the benchmark set. 150 (75%) participants agreed and 50 (25%) disagreed that most of teachers in their schools we re not trained on how to use ICT tools with the mean score 3.03>2.50 greater than the statistical

benchmark set. Finally, 198 (99%) of the participants agreed while 2 (1%) disagreed that ICT training should be made compulsory for all teacher with the mean response 3.73>2.50 higher than the statistical benchmark set. With the grand mean value of 3.38 was well above the statistical benchmark of 2.50. Based on this finding, it implies that majority of the teachers agreed on the importance of ICT training for effective teaching and learning. In addition, it seems not all the teachers benefitted from the Lagos State Government ICT training and this should be really looked into in ensuring wider coverage of the programme for all teachers.

Testing of Hypothesis

Hypothesis: This hypothesis states that there is no significant relationship between teachers

level of ICT training and usage of ICT for teaching in Lagos State.

Pearson Product Moment Correlation was used to test this hypothesis; the result of the analysis is presented in Table 3.

Table 2: Analysis of the relationship between teachers’ level of ICT training and usage of ICT for teaching in Lagos State.

| Variable | Mean | SD | N | df | r-cal. | r-crit. | Decision |
|---------------------------|-------|------|-----|-----|--------|---------|-------------------------|
| ICT Training | 16.87 | 2.03 | 200 | 198 | 0.51 | 0.138 | H ₀ Rejected |
| Usage of ICT for teaching | 17.51 | 3.43 | | | | | |

P < 0.05, df = 198.

Information on table 2 above revealed that the calculated „r value (r-cal. = 0.51) is greater than the „r critical (crit „r = 0.138) given 198 degrees of freedom at 0.05 level of significance, hence, the null hypothesis which says that there is no significant relationship between teachers level of ICT training and usage of ICT for teaching in Lagos State is rejected and the alternate hypothesis is accepted. Therefore, this implies that there was significant relationship between teachers level of ICT training and usage of ICT for teaching in Lagos State.

Discussion of Findings

The results show that there was a significant relationship between teachers level of ICT training and usage of ICT for teaching in Lagos State. The calculated „r value (r-cal. = 0.51) is greater than the „r critical (crit „r = 0.138) given 198 degrees of freedom at 0.05 level of significance. This result aligns with a study conducted by Venezky (2014) who found that professional development was one of the most important support in most schools for ICT integration into teaching as it has the greatest impact on the beliefs and practice of teachers. Sandholtz & Reilly (2004) also concluded that teachers technology skills are strong determinant of ICT integration, but they are not conditions for effective use of technology in the classroom. They argue that training programs that concentrate on ICT pedagogical training instead of technical issues and effective technical support, help teachers apply technologies in teaching and learning in a classroom setting. This also confirm the finding emanating from the

Research Question. The finding implies that majority of the teachers supported the need to be empowered through acquisition of relevant skills on the usage of ICT for effective teaching and learning in schools. In addition, it seems not all the teachers benefitted from the Lagos State Government ICT training and this should be really looked into in ensuring wider coverage of the programme for all teachers in the state.

Recommendation

Based on the findings, it was recommended that there is need for training and re-training of teachers especially the older ones to integrate them into the digital era and equip them adequately for ICT usage for teaching and learning in schools.

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Development and Validation of Instrument for Assessing Students Reasoning About P-Value and Statistical Significance for Improving the Quality of Research in Tertiary Institutions in Nigeria.

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Abstract

Regardless of the common use, statistical significance test procedures and P-values have been misinterpreted by authors and misunderstood by students in virtually every discipline. In light of this need, the researchers delves into the development and validation of an instrument for assessing students' correct conceptions and misconceptions of p-values and statistical significance to improve the quality of research in tertiary institutions in Nigeria. The study adopted instrumentation design. It was carried out in University of Uyo, Akwa Ibom State College of Education and Akwa Ibom State Polytechnic in Akwa Ibom State. The population of the study comprised of 7, 520 research students in the three tertiary institutions in Akwa Ibom State. Purposive sampling was used to select sample size of 120 students used for the study. To guide the study, four research questions were posed and four hypotheses were formulated and tested at 0.05 level of significance. The instrument for data collection was the statistical significance and reasoning about p-value rating scale SSAPRS. The internal consistency reliability coefficient of the rating scale revealed 0.85 reliability. Data from the research subjects were analyzed using factor analysis, Cronbach's alpha, mean and standard deviation, analysis of variance (ANOVA), post hoc test and t-test statistic. It was found out that there was significant difference in the mean scores of the three ability groups (High, average and low competent). Post hoc revealed that there was a significant difference in the mean scores of the high ability and average ability. It was therefore recommended that statistical literacy should be stressed in the introductory courses and that literacy may be necessary to demonstrate statistical reasoning or thinking about inference. In addition to stressing statistical literacy, statistics educators might target instruction and assessment to address prevalent inferential misconceptions for introductory research students.

Keywords: P-value, development, statistical significance, validation.

Introduction

The advent of the information age has seen people across the world having easy access to statistics. The society benefits greatly from the ability to appropriately interpret and understand statistics. Deemed

more of importance than the theory and mechanics of statistics is the analysis of the data, the interpretation of the data and communicating the findings. Tertiary institution students at the end of their schooling are expected to carry out a research

work. Whatever kind of research one is doing, there comes a moment when one needs to offload the ideas that have emerged from the analysis. These needs to be converted into written text that will make sense to the reader, and do justice to the findings. The major task of research writing involves working out how to make contextually grounded theoretical points that are viewed as a contribution by the relevant professional community of readers. Statistics course help students gain the foundation necessary to help with interpreting and understanding statistics. In addition to understanding statistics, students are expected to learn to properly communicate their findings through a myriad of forms, including graphs, pie charts, histograms, and written paragraphs. Instruction including a focus on p-value and statistical significance is critical to developing these skills.

Students in virtually every discipline encounter P-values when they read research articles in their field. Regardless of the common use, statistical significance test procedures and P-values have been misinterpreted by authors and misunderstood by students in virtually every discipline (Nickerson, 2000). Professionals in the field of statistics and mathematics education have drawn attention to the need for reliable and valid instruments to facilitate statistical and mathematics education research (Ben-Zvi and Garfield, 2004; Garfield, 2006). In response to this call, a working group organized by the American Statistical Association with funding from the National Science Foundation, met and discussed on how to use scientifically-based research methods in mathematics education research (Scheaffer and Smith, 2007). These 20 mathematics educators and statisticians came out with a five-component research program to improve research in mathematics education these are, generating ideas, framing the ideas in a research setting, examining research questions in small studies, generalizing results in larger studies, and extending results over time and institutions. The main aim of this research program is to link and accumulate results across studies by using proven assessment instruments. The development of appropriate measurement scales and adequate assessment of their properties (validity, reliability, and fairness)

are critical. The key questions are: Can the essential background variables be measured? Are appropriate outcome measures and related measurement instruments already developed? (Scheaffer and Smith, 2007)

Research studies in the fields of statistics, statistical and mathematics education, psychology, and educational psychology reveals that most students have difficulties or misconceptions understanding probability and statistics. Researchers have examined how people's prior intuitions, heuristics, and biases may impact their reasoning about problems in probability, data analysis, and descriptive statistics and studies have been conducted to understand the impact of instruction on students' correct conceptions and misconceptions of probability and statistics (Chance, delMas, and Garfield, 2004; Garfield, 2006; Wainer and Robinson, 2003). The goal of this study is to develop an instrument for statistics education research assessment that shows evidence of making valid inferences about students' inferential understanding.

In order to develop and validate a research instrument to assess reasoning about P-values and statistical significance, it is necessary to define what P-values and statistical significance means and what constitutes a correct understanding. P-value definitions varied in their emphasis and terminology employed. Some defined the P-value in relation to test statistics. The P-value (also sometimes called the observed significance level) is defined by Devore and Peck (2005) as a measure of inconsistency between the hypothesized value for a population characteristic and the observed sample. It is the probability, assuming that H_0 is true, of obtaining a test statistic value at least as inconsistent with H_0 as what actually resulted. Moore (2004) sees P-value as the probability computed, assuming H_0 is true, that the test statistics would take a value as extreme or more extreme than that actually observed. The smaller the P-value, the stronger the evidence against H_0 provided by the data. The p-value is computed by assuming the null hypothesis is true and then determining the probability of a result as extreme (or more extreme) as the observed test statistic in the direction of the alternative

hypothesis (Chance and Rossman, 2006). The ultimate goal of the calculation is to obtain a P-value the probability that the observed statistic value (or even more extreme value) could occur if the null hypotheses were correct. (De Veaux, Velleman, and Bock, 2006). Similarly, statistical significance is defined as the value of the test statistic that leads to the rejection of H_0 at the chosen level of alpha (Devore and Peck, 2005).

When the test statistic is in the rejection region, it is concluded that the result is statistically significant and the null hypothesis not accepted, if otherwise, accept the null hypothesis (Utts and Heckard, 2004). It is always true that if the $p\text{-value} < \alpha$, then the test statistic falls into the rejection region, and vice versa. However, the p-value method allows researchers to determine what decision would be made for every possible value of α . P-value and statistical significance is an important topic for students learning statistics. Students attaining a conceptual understanding and interpretation of the P-value opens the door to a wide array of statistical procedures that utilizes this inferential logic, including testing coefficients in simple and multiple regression and longitudinal analysis and testing group equivalence or membership in one- and two-way analysis of variance (ANOVA), analysis of covariance (ANCOVA), multivariate analysis of variance (MANOVA) and multivariate analysis of covariance (MANCOVA). Students who reason statistically would understand how P-values, significance levels, and confidence intervals are related; for example, a 95% confidence interval for a mean will reject any value of the null hypothesis that is outside the interval at a two-tailed 5% significance level. The student who exhibits proper reasoning about P-values understands how sample size relates to the magnitude of the P-value and would understand that large sample sizes lead to statistical significance even when there are small, unimportant differences from a practical perspective (Garfield et al., 2005). Students who think statistically should be aware of P-values and statistical significance in the broader context of statistical investigations. A statistical thinker understands why P-values should be complemented with confidence intervals (de Veaux et al., 2006).

In measuring the extent to which mastery has been achieved or attained and for the test instrument to be good enough to measure the expected performance of students, it is expected that the developed test instrument must possess and satisfy certain psychometrics properties. Psychometric properties of a test item involves the mental measuring abilities of a test following certain peculiarities or characteristics that helps to distinguish it or expected to be possessed by the test item such as item reliability and item validity (Gall, Gall and Borg2007). The validity of test items is the degree to which a test or an instrument measures what it is supposed to measure or the soundness of the interpretation of a test and the research curriculum for statistical inferences. (Cohen, Manion, Morrison, Bell, Martin, McCellock and O'Sullivan 2011; Thomas and Nelson (cited in Olaitan, 2014). The Authors classified validity into the following: Face (logical), Content (Domain), Construct and Criterion referenced (Concurrent and Predictive) validity. Reliability of a test item on the other hand is the ability of the test items to produce consistent result each time the test is used (Cohen et al., 2011). In estimating the reliability of a test item, Nwana (2007) outlined the following methods; test retest method, parallel or alternative form method, split half method and internal consistency. Test retest measures the stability of the instrument, Parallel or alternative form method measures similarity or equivalence of two different form of test, or being identical with the other test in nearly all respects. Split-half method measures internal consistency. In the context of this study, Psychometrics properties of the test items involves the measuring abilities of the test items to show the item difficulty, the extent to which it discriminates among programmes Doctoral, Master, Undergraduates and competent groups (High, Average and Low competence) and ability to minimize guessing in order to make the test instrument reliable.

The current mode of assessing student understanding of statistical significance and reasoning about p-value at the tertiary institutions in Nigeria is done through the use of an achievement test instrument developed in the cognitive domains of educational

objective to measure only the recall of facts and which are considered unsuitable for such a skill oriented learning programme. This mode of assessment can only help to determine student achievement in the cognitive domain and not the practical assessment instrument that makes use of a rating scale that can rate a major procedural steps required to perform and finish the task, of research project thereby rendering it valid and reliable for assessing the skills of student in research work.

There are about 14 identified difficulties that people seem to have with understanding and interpreting P-values and statistical significance from the literature and sorted into four categories as, misunderstanding statistical significance terminology and basic concepts, confusing relationships between inferential concepts, misapplying the logic of statistical inference and lastly misinterpreting the P-value as the probability of the truth or falsity of hypotheses. A research instrument is needed that assesses each of the 14 difficulties. This list of difficulties was, therefore, used to design the statistical significance and reasoning about p-value rating scale SSAPRS test blueprint.

Before developing a new instrument for statistics education, it is important to determine whether research instruments exist that validly assess the desired content and produce reliable scores (Scheaffer and Smith, 2007). To answer the call for measures with reported reliability and validity to further research in statistical education (Garfield and Ben-Zvi, 2004), instruments with reported psychometric properties have been developed. These existing instruments include the Statistical Reasoning Assessment (SRA; Garfield, 2003); Assessment Resource Tools for Improving Statistical Thinking (ARTIST) topic scales (delMas, Ooms, Garfield, and Chance, 2006); Statistics Concepts Inventory (SCI; Allen, Stone, Rhoads, and Murphy, 2004); and the Comprehensive Assessment of Outcomes in a first Statistics course, the CAOS test (delMas, Garfield, Ooms, and Chance, in press). Why these assessments do not meet the current need is that none of these existing instruments address all the content identified as misconception of reasoning about

p-value and statistical significance. Therefore, this study addressed the following questions:

1. What are the appropriate items to be included in the SSAPRS for assessing students' understanding of and difficulties with reasoning about P-values and statistical significance?
2. What is the validity and reliability of the instrument SSAPRS?
3. What are the mean responses of students in different programmes (Doctoral, Masters' and Undergraduates) as measured by SSAPRS?
4. What are the mean responses of male and female students to SSAPRS?

Hypothesis

HO1: There is no significant difference in the mean scores of the students of three competent groups (High, Average and Low competent) on the developed SSAPRS.

HO2: There is no significant difference between the mean scores of male and female students as measured by response on SSAPRS.

HO3: There is no significant difference between the mean response scores of male and female students as measured by the SSAPRS.

HO4: There is no sufficient scores reliability to make inferences about an individual respondent's true understanding.

Methodology

This study employed instrumentation research design. Anchoring on the views of Frankael and Wallen (2000) Business Dictionary (2013) and Abonyi (2003), instrumentation research design entails the development of an assessment technique and the condition of administration of the technique. Hence the design is appropriate for this study. The target population consisted of all undergraduate, Master's and Doctoral students in University of Uyo, Akwa Ibom State College of Education and Polytechnic, Akwa Ibom State, Nigeria. The 120 students that constituted the sample for the study were selected purposively from faculty of education and school of Sciences, Mathematics and statistics. Forty students were selected from each of the school. The instrument for the study consisted of 15 items generated from an initially constructed 32 items. The initially constructed 32 items rating scale was modified to reflect the ongoing literature review, pilot results, and

input from five statistics education lecturers from three universities.

These 32 items were subjected to factor analysis on the basis of the criteria set for rejecting items: a factor loading less than 0.35; factor loading in more than one factor; factors that did not meet up to the standard loading of 0.35 and above. Item which its difficulty level and discriminating index did not function as expected on the basis of not failing between 0.3 -0.8 (difficulty level- p – value) and 0.35 – 0.75 (Discriminating power – D- value) were expunged. The scores on the 15 items that fell within the stated P-value and D-value were subjected to Cronbach alpha which yielded a coefficient value of 0.85 and thus ensured the validity of the instrument. The reliability coefficient of the instrument was determined using the result of the factor analysis which has shown to be internally consistent as this was evidenced from the values of alpha reliability coefficients obtained for the items. Developing a test blueprint was the first step in defining the construct, conceptions, and misconceptions of P-values and statistical significance. Hence a test blueprint was developed to specify the content areas to be assessed. When mapped to test items, test blueprints provide content-related validity evidence. The preliminary test blueprint was bases on the difficulties culled from the research literature formed the bases for the preliminary test blueprint.

The 32-item SSAPRS instrument was initially developed per the preliminary item

blueprint. SSAPRS items originated from four multiple-choice (MC) items selected because they directly addressed P-values and statistical significance and could be linked to some of the difficulties identified in the literature review, a set of multiple-true-false (MTF) item added so each of the misconceptions identified in the literature review was assessed, students were asked to also rate their level of confidence in their answer on a scale from 0-100% confident and open-ended questions were also used. Results were analyzed to assess if confidence weightings might explain variation in scores, five educational research professionals reviewed the SSAPRS and gave their expertise feedback which helped in the development of the instruments. Both undergraduate and graduate students participated. The statistics courses were targeted for science majors. The undergraduate course was introduction to statistics and the master’s and doctoral level course was advance statistics. The data collected were subjected to factor analysis, Cronbach’s alpha, mean and standard deviation, analysis of variance (ANOVA), post hoc test and t-test statistic.

RESULTS

This chapter presents the results of the study according to the research questions and hypotheses that guided the study.

Research Question 1: What are the relevant items for inclusion in the rating Scale for assessing students’ understanding of statistical significance and reasoning about p-value?

Table 1: Mean ratings and standard deviations of respondents on the appropriateness of the items for inclusion in the SSAPRS rating scale N = 120

| SSAPRS-CC or MC | | MEAN | SD | REMARK |
|--------------------------------------|---|------|------|-------------|
| 1. Smaller the P-value | C | 3.78 | 0.77 | Appropriate |
| 19. Large difference or effect | C | 3.77 | 0.63 | „ |
| 15. P-value as always low | M | 3.85 | 0.71 | Appropriate |
| 10. Strength of evidence | C | 4.12 | 0.98 | „ |
| 1. Textbook definition | C | 3.99 | 0.87 | „ |
| 12. P-value as rareness measure | C | 3.62 | 0.65 | „ |
| 3. Lay definition | C | 3.81 | 0.86 | „ |
| 18. Type I / α and P-value | M | 4.40 | 0.83 | „ |
| 26. Sample and population | M | 4.30 | 0.73 | „ |
| 27. Sample size and significance | C | 4.10 | 0.73 | „ |
| 11. Chance as cause of results | M | 3.90 | 0.77 | „ |
| 4. Conclusions and study design | M | 4.30 | 0.64 | Appropriate |
| 14. Converse as true | M | 3.80 | 0.91 | „ |
| 23. Probability: alternative is true | M | 4.20 | 1.12 | „ |
| 20. Probability: null is false | M | 4.30 | 1.12 | „ |

Table 1, shows the rating of the research experts on the 15 items that assessed correct and misconception of students reasoning about p-value and statistical significance as relevant with mean ranging from 3.62 to 4.80. This signifies that the 15 items were accepted by all respondents as appropriate for inclusion in the SSAPRS for assessing student's understanding and recognition of a correct conception item as correct or identified a misconception item as incorrect.

Research Question 2: What is the validity and reliability of the instrument (SSAPRS)?
The responses of the students' 32-items (SSAPRS) was scored and subjected to factor analysis using rotated component matrix. In doing this, the varimax with Kaiser Normalization was done with reference to students' responses to the 32-items. The summary of the varimax rotated factor loadings for the 32- items is shown below in tables, 2

Table 2: The Nine Mathematics Classroom Environment Assessment Scale and their factor loadings (student actual form)

| Scales | Items | Item loadings |
|--|-------|---------------|
| Basic literacy | 1 | 0.617 |
| | 3 | 0.640 |
| | 5 | 0.494 |
| | 10 | 0.789 |
| | 12 | 0.590 |
| | 15 | 0.663 |
| | 19 | 0.658 |
| Relationships between concepts | 18 | 0.907 |
| | 26 | 0.883 |
| | 27 | 0.776 |
| Logic of inference | 4 | 0.756 |
| | 11 | 0.763 |
| | 14 | 0.883 |
| Belief in the truth or falsity of hypotheses | 20 | 0.858 |
| | 32 | 0.780 |

For selecting the items important for inclusion in the rating scale, 0.35 as factor loading was used. Any item with factor loading of 0.35 and above was important and any item with factor loading less than 0.35 was not important. The summary of the result presented in table two showed that out of 32 items of the instrument, 15 items loaded up to and above 0.35 and was acceptable as

suitable for use in the study. Items: 2, 6,7,9,13,17,21,25,28 and 30 loaded less than 0.35, while items: 8,16,22,23,24,29 and31 were factor loaded up to 0.35 in more than one factor, which was considered complex and the items were dropped.
Table 3 shows the results of the Cronbach alpha test on the 15 items of the SSAPRS.

Table 3: Students SSAPRS and its Reliability Coefficient

| Scales | Items | Reliability Coefficient |
|--|-------------------|-------------------------|
| Basic literacy | 1,3,5,10,12,15,19 | .897 |
| Relationships between concepts | 18,26,27 | .770 |
| Logic of inference | 4,11,14 | .879 |
| Belief in the truth or falsity of hypotheses | 20, 32 | .858 |

The initial stage of the instrument development involved the construction of 32

items of SSAPRS. The 32 items were subjected to trial testing in which 15 items

scaled through. Table 3 above showed the reliability coefficient in the four scales, were all highly reliable.

Research Question 3: What are the mean responses of students in different programmes as measured by SSAPRS?

To answer this research question, the magnitude of the mean and standard deviation scores of the students in SSAPRS were presented in Table 4.

Table 4: Means and standard deviations of students’ responses in different programmes to SSAPRS

| Programme | N | \bar{X} | SD |
|---------------|-----|-----------|-----|
| Undergraduate | 40 | 2.94 | .45 |
| Master | 40 | 3.01 | .41 |
| Doctoral | 40 | 2.91 | .46 |
| Total | 120 | 2.95 | .44 |

The result of data analysis in Table 4 shows the means and standard deviations of the responses of students according to different programmes. The responses showed that undergraduates had a mean response of 2.94 and standard deviation of 0.45; Masters had a mean response of 3.01 and a standard deviation of 0.41, while Doctoral had a mean response of 2.91 with standard deviation of 0.46 respectively. This implies that there are

differences in the identification of correct conception and misconceptions of the students in different programmes with regards to their reasoning about p-values and statistical significance. The analysis showed that students from different programmes reasoned differently.

Research Question Four: What are the mean responses of male and female students to the instrument SSAPRS?

Table 5: Means and standard deviations of male and female students’ responses to SSAPRS

| Gender | N | X | SD | df | t-cal | sig (2-tail) |
|--------|----|------|-----|-----|-------|--------------|
| Male | 60 | 1.89 | .35 | | | |
| Female | 60 | 1.82 | .33 | 118 | .002 | 2.112 |

Table 5 showed the mean and standard deviation of male and female students that responded to the SSAPRS. Male students had a mean response of 1.89 and standard deviation of 0.35 while the female students had a mean response of 1.82 and standard deviation of .33. The analysis implies that there are differences in the responses of

students to SSAPRS with respect to gender. The mean responses of male students were higher than that of the female students.

Hol: There is no significant difference in the mean responses of students in the three programmes (Doctoral, Masters and Undergraduates) on the SSAPRS.

Table 6: Analysis of Variance (ANOVA) of the mean responses of the three groups of students (Doctoral, Masters and Undergraduates) in the SSAPRS.

| Level of Scale | Number Of item | Sum of Square | Mean Square (Residual) | df | F-ratio | E ² | P-value (Sig) | |
|--|----------------|---|---------------------------|-----------------|---------|----------------|---------------|---|
| Basic literacy | 9 | Between: 23.858 Within: 2,114.202 Total: 2,138.060 | 11.929 3.146 15.075 | 2 118 120 | 3.792 | 0.993 | 0.023 | S |
| Relationships Between concepts | 6 | Between: 27.070 Within: 2,185.840 Total: 2,212.910 | 13.535 3.253 16.788 | 2 118 120 | 4.161 | 0.992 | 0.016 | S |
| Logic of inference | 6 | Between: 43.917 Within: 2,185.840 Total: 4,175.075 | 21.959 6.148 28.107 | 2 118 120 | 3.572 | 0.993 | 0.029 | S |
| Belief in the truth or falsity of hypotheses | 6 | Between: 45.253 Within: 4, 293.665 Total: 4,338.918 | 22.627 6.389 29.016 | 2 118 120 | 3.541 | 0.993 | 0.030 | S |

F-critical = 2.17; E2 = correlation ratio.

Table 6 data revealed that the p-values of the students’ responses of the SSAPRS in the four level of the scale were (1) 0.023, (2) 0.016, (3) 0.029, (4) 0.030. These values were less than the p-value of 0.05 indicating that there is significant difference in the mean responses of the three groups of students (Doctoral, Masters and Undergraduates) on the SSAPRS items.

Also the table revealed that the calculated F-ratios for the four levels of the scale were (1) 3.792, (2) 4.161, (3) 3.572, (4) 3.541 and were greater than the F-critical value of 2.17 at 2 and 118 degrees of freedom. This indicated that there is significant difference in the mean response of the students in the three programmes (Doctoral, Masters and Undergraduates) on the SSAPRS. Therefore, the null hypothesis of no significant difference in the mean response of the three groups was

rejected. Post-hoc analysis using Tukey-Kramer multiple comparison test was done to determine the direction of difference of the mean responses of the three programmes. The result showed that there was no significant difference between the Doctoral and Master compared but there is significant difference in the mean response of the Doctoral and undergraduate group compared. The direction of difference is that Doctoral and Master do not differ while undergraduate differed indicating that the items were not difficult for Doctoral and Master but were difficult for undergraduates.

Ho2: There is no significant difference in the mean response of the three groups of students (High competent, Average competent and Low competent) on the SSAPRS.

Table 7: Showed Analysis of Variance (ANOVA) of the mean response of the three groups of students (High competent, Average competent and Low competent) on the rating scale items.

| Level of Scale | Number Of item | Sum of Square | Mean Square (Residual) | df | F-ratio | E ² | P-value (Sig) | |
|--|----------------|--|----------------------------|-----------------|---------|----------------|---------------|---|
| Basic literacy | 9 | Between: 20.289 Within: 2,182.413 Total: 2,202.703 | 10.145 3.248 13.393 | 2 118 120 | 3.124 | 0.993 | 0.045 | S |
| Relationships Between concepts | 6 | Between: 32.988 Within: 2,175.126 Total: 2,208.114 | 16.494 3.237 19.731 | 2 118 120 | 5.096 | 0.991 | 0.006 | S |
| Logic of inference | 6 | Between: 61.072 Within: 4,464.935 Total: 4,526.007 | 30.536 6.644 37.180 | 2 118 120 | 4.596 | 0.991 | 0.010 | S |
| Belief in the truth or falsity of hypotheses | 6 | Between:46.501 Within: 4, 196.605 Total: 4,242.106 | 23.251 6.2465 29.496 | 2 118 120 | 3.723 | 0.993 | 0.023 | S |

F-critical = 2.17; E2 = correlation ratio.

Table 8 revealed that the p-values of the students' response based on the four levels of SSAPRS were (1) 0.045, (2) 0.006, (3) 0.010, (4) 0.023. These values were less than the p-value of 0.05

indicating that there is significant difference in the mean response of the three groups of students (High competence, Average competence and Low competence) on the scale items.

The table showed the calculated F-ratios for the four levels of the scale to be (1) 3.124, (2) 5.096, (3) 4.596, (4) 3.723 and were greater than the F-critical value of 2.17 at 2 and 118 degrees of freedom. This indicated that there is significant difference in the mean response of the three ability groups of students on the scale items. Therefore, the null hypothesis of no significant difference in the mean performance of the three groups was rejected.

The Post-hoc analysis was carried out to determine the direction of difference of the mean performance of the three groups (High competent, Average competent and Low competent).

The q-calculated values for the four levels ranged from 0.145 to 3.196 and they were less than q-critical but greater than p 0.05 indicating that there was no significant difference between the high competence and average competence compared; The high competence versus low competence group compared had q-values ranging from 3.526 to 5.087. These values were greater than q-critical (3.360) and less than p 0.05 indicating that there is significant difference in the mean response of the high and low competence group compared. The direction of difference is that high and average competence do not differ while low competence differed indicating that the items were not difficult for high and average competence but were difficult for low competence group.

HO3: There is no significant difference between the mean response scores of male and female students as measured by the SSAPRS.

The analysis of data in table 5 revealed that the t-test analysis for the mean response scores of male and female students as measured by the SSAPRS had the calculated value of t (3.112) and the p- value of .002. For the fact

that their p- value is less than .05 level of significance, the null hypothesis is not accepted meaning that there was significant difference between the mean response scores of the reasoning about p-value and statistical significance of male and female students as

measured by the SSAPRS favoured male students.

HO4 . There is no sufficient scores reliability to make inferences about an individual respondent’s true understanding.

Table 7: Mean Proportion of Correct Responses for Three Item Groupings: Correct Conceptions and Misconceptions, Content Areas, and Learning Goals (N = 120)

| Three item groupings | Mean proportion of Correct response ($\hat{p} \hat{\mu}$) | Number of items |
|--|---|-----------------|
| Correct conception and misconception items | | |
| Correct conceptions | .66 | 13 |
| Misconceptions | .55 | 14 |
| Content areas defined by the test blueprint | | |
| Basic literacy | .68 | 13 |
| Relationships between concepts | .55 | 6 |
| Logic of inference | .48 | 4 |
| Belief in the truth or falsity of hypotheses | .55 | 4 |
| Learning goals for statistics instruction | | |
| Statistical literacy | .71 | 9 |
| Statistical reasoning | .57 | 14 |
| Statistical thinking | .48 | 4 |

Table 7 reports the proportion of correct responses (SSAPRS- item difficulty) and corrected item-total correlation by item. Learning goals and correct conception or misconception are also identified. Items are sorted by proportion of correct responses within blueprint category.

Summary of the Findings

Discussion of Findings

The result of data analysis on the relevant scale items appropriate for inclusion in the statistical significance and reasoning about p-value rating scale in statistics course reveals that the respondents rated 15 items as appropriate for inclusion in the rating scale. Thus the instrument are content and construct valid and highly reliable for the assessment of students understanding of correct conception and misconception of statistical significance and reasoning about p-value in research project. It was found out that there were significant differences in the mean responses of students in the three programme (Doctoral, Masters and Undergraduates) as well as the three competent groups (High competent, Average competent and Low competent)

on the rating scale items, post hoc test analysis further revealed that the undergraduates and low competent groups differed significantly in response from the Doctoral and Masters as well as the High and Average competent groups. Gender Differential response of Students in the SSAPRS showed significant gender differential response among students. These differences in gender were acknowledged by Olagunju (2001), Koehler (2003) and Norfleet (2007) asserted that the differences in achievement between males and females in Mathematics were due to the existence of a genetic effect favouring males in the areas of spatial visual ability. Scores are not sufficiently reliable to make inferences about an individual respondent’s true understanding. To infer what respondents did or did not understand, item responses are discussed across four item groupings: **Item Results Grouped by Correct Conceptions and Misconceptions, Item Results Grouped by Four Content Areas Defined by the Blueprint, . Item Results Grouped by Three Learning Goals and Item Results Grouped by Three Levels of Difficulty** . The results revealed that after instruction, the

respondents seemed to hold contradictory inferential conceptions (Garfield et al., 2005 ; Garfield et al., 2004). Three of the four content areas were moderately to very difficult for these respondents: understanding relationships between inferential concepts, applying the logic of inference, and belief in the truth or falsity of hypotheses. Items related to basic literacy were understood by the largest proportion of respondents. Analyzing items based on the three targeted learning goals, most respondents seemed to exhibit a good understanding in terms of statistical literacy. Statistical reasoning and thinking were more difficult. SSAPRS results seem to support the relationships between statistical literacy, statistical reasoning, and statistical thinking as described by delMas (2002) Grouping the 15 most reliable items by the proportion of correct responses (difficulty) provides a reliable measure of respondents' understanding and misunderstanding. The least difficult items identify content for which most respondents had obtained a good understanding. The moderately difficult items identify content that only a little more than half of the respondents understood. The most difficult items identify content that many of the respondents (45% or more) did not understand as supported by Batanero, 2000; Mittag and Thompson, 2000 findings.

Implications for Future Research

1. Future research should build on results for each of the research questions and hypotheses. In terms of SSAPRS development, reliability improvement should be pursued. For this study, reliability was estimated with Cronbach's coefficient alpha to facilitate comparison of reliability across studies. To improve reliability, items that were judged to be redundant and removed from the scale might be reintroduced to lengthen the scale with items that correlate with the SSAPRS.
2. Internal consistency reliability may also be constrained by students' inconsistent reasoning on these kinds of items. If inconsistent student reasoning across content areas limits the internal consistency reliability of scores, a test-retest (stability) correlation may be a better measure of score reliability than internal consistency.

3. Another line of future research should use the SSAPRS to explore respondents' inferential reasoning. In future studies, Item Response Theory (IRT) may provide more information about respondents' abilities along with information about items. If a factor analysis of scores from the next version of the SSAPRS indicates it measures a unitary construct, then IRT may be a useful tool for analyzing results.

4. Administration of SSAPRS with and without instructional interventions may facilitate evaluating the effectiveness of new teaching approaches on inferential understanding.

Conclusions

This study developed the Statistical Significance and the Reasoning about P-values rating scale (SSAPRS) to assess students' conceptual understanding and misunderstanding. The results provided strong evidence of content validity and construct-related validity and higher reliability. The content of the 15-item SSAPRS appears to be sufficient for assessing research students' understanding. Most respondents in Doctoral and Masters programme had adequate exposure to these inferential concepts across disciplines, lecturers, books, and teaching methods. This research makes two contributions to statistics education research. First, evidence of introductory students' correct conceptions and misconceptions about P-values and statistical significance was documented using an instrument with reported psychometric properties. Second, with improved reliability SSAPRS could be used in a research program to link results across studies that examine students' inferential understanding as called for by Garfield (2006), Scheaffer and Smith (2007).

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