

EFFECT OF COGNITIVE RESTRUCTURING ON TRUANCY REDUCTION AMONG SECONDARY SCHOOL STUDENTS IN EKITI STATE, NIGERIA

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Abstract

The study investigated the effect of cognitive restructuring on truancy reduction among secondary school students in Ekiti State. Three research questions were raised and three hypotheses were answered and tested. The research design was a 2x2x2 factorial design consisting of one treatment, control group, gender and school location. The sample consisted of 144 truant students drawn from four schools out of sixteen local governments using a multistage sampling technique. The research instrument was a questionnaire tagged 'Self Perception on Truancy Behaviour Questionnaire (SPTBQ). Participants were randomly assigned to treatment, control group and pre-tested and post-tested with the questionnaire. The experimental group were subjected to the treatment. The data were analysed using, Analysis of Covariance and Multiple Classification Analysis. Findings revealed that there was a significant difference in truancy reduction of students exposed to the treatment and control group. The study also revealed that there was no significant difference in truancy reduction due to gender and location of students exposed to treatment. Based on the findings, it was recommended that teachers, counsellors and psychologists should adopt cognitive restructuring in assisting students to improve their school attendance.

Keywords: Cognitive Restructuring, Truancy and Truancy Reduction.

Introduction

Truancy has been described as the act of absenting oneself from school without the permission of one's parent or school authorities (Baker, 2010, Folgman and Hebbet, 2005). It is reported that many students do not take school activities seriously, they come late to school or stay away totally from school (The Nation Newspaper, Monday, November 15th 2010). Some students' attitude to school work can come under truancy behaviour or tendency to be truant, for example seeking permission for an excessive number of times to be absent from school. A student may call the authorities on phone feigning one reason or the other why he/she would not be in school and therefore proceed to be absent from class. Some students wear their school uniform from home pretending to be away to school, but hang on the way and not getting to school.

Some may attend one class but not attend the other classes. It has been noticed that some students do not get to school after leaving home while some get to school in their leisure time. Some young people on every school day in Nigeria are absent from school. On every street in Nigeria, school-age children are seen, hawking wares, assisting parents and other masters in various forms of trade, serving as bus conductor or even drivers during school hours. Some are even engaged as political thugs. Some students during school hours roam about begging for money, helping travellers to carry the load to earn some money, some students loiter around the streets without regard for their future. There is, therefore, a need to search for means of reducing truancy in school. This study investigated the effectiveness of cognitive restructuring technique in truancy reduction among secondary schools' students in Ekiti State.

A number of factors such as place of residence and gender may be related to truancy. The reasons for truancy behaviour students in the rural area may be different from those in urban areas. In rural areas some students may be involved in hawking wares from one village to another, staying in the stream fishing or roaming about the farm settlement to gather fruits and nuts to sell. The parents in rural areas may exercise their authority to get their children to go to the farm. In the rural areas' children may be required to use co-operative effort in farm work. At one time they may work on the farm of a parent and at another time they move to the farm of another parent. Some parents may collect a loan which they have to repay with interest. This could make the parents need the assistance of their children in farm work and thereby reduce the attendance of their children in class. On the other hand, students living in the urban area may have the habit of watching films including sex films on the internet, playing games and searching for friends on Facebook, E-buddy, Mxit, Nimbuzz, 2go, twitter, BB messenger, communicating on WhatsApp, engaging in internet fraud popularly known as 'yahoo'. In Ekiti State where students are given free laptops by government, they may use them for these purposes rather than to improve their educational pursuit.

There are some factors that can make male students more prone to truancy than female students, for example, games, "yahoo" burglars, auto-theft and vandalism. These acts appear to be more common among male students than female students. On the other hand, females are more likely to take additional dress along with their school uniform in which they can disguise themselves whenever they want to visit their boyfriends.

The decision to absent oneself from school may stem from ones thought about school, school attendance and benefits or otherwise to be derived from school attendance. Some of the thoughts may be negative or irrational. Truancy may appear to be a response to frustration and anxiety associated with difficult lessons. A student who fails mathematics once may have distorted thought that he cannot pass the subject again. This may make him dislike the subject and the teacher, and thereby refuse to attend the class again until he turns to be truant, engaging in other unworthy activities. Some students may think that going to school is just a waste of time since; some rich people in society may not have been educated. Farrington and Flick (2010) identified some cognitive distortions that people tend to have in their information processing, that lead to truancy as overgeneralization and mental filter.

Over-generalization. This is a common cognitive bias that causes people to mistakenly conclude that things are worse than they really are. It is possible for a student to conclude on the basis of failure in one subject that he has totally failed and therefore become a truant.

Mental filter. This occurs when someone systematically attends only to a portion of the information presented in an event, while forming their appraisal of that event, for example, taking negative information about the event seriously and discarding any positive information. The cognition that the truant has about wealth, for example having higher education does not necessary give people the opportunity to be rich or privilege over those who do not go to school at all is a case of mental filter.

Beck (2011) described cognitive restructuring as an insight behavioural procedure that emphasizes recognizing and changing negative thoughts and maladaptive beliefs. It is based on the assumption that cognitive distortions are the major determinants of how we feel and act. Thought according to Beck (2009) can be seen as mental behaviour typically taking the form of unspoken conversation running commentaries, visual images or sound. These always occur in one form or another throughout the life of individuals who sometimes are aware of their thought, and sometimes unaware. It is believed that some people can control them when they choose but cannot turn them off.

According to Morrison (2011), it is assumed that students have difficulty with school work and play truant without investigating how they learn and process information. Research information on cognitive style provides insight into how some truants learn (Riding and Read, 2006). He explained that

cognitive restructuring helps individuals to organize and process information. Harvey (2007) stated that there are two basic dimensions of cognitive style, namely the holistic analytical style, which indicate an individual's performance for processing information either as a whole or in parts, and the verbal-imagery style, which shows a tendency to represent information during thinking either verbally or in mental images.

Riding and Read (2006) conducted a research on students who have a condition that is known as school refusal. A student who has such a condition refuse to attend school but stay at home when not in school, complain about headaches, stomach pains or nausea and show signs of anxiety and depression. Flower and Hayes (2007) added that such students tend to complain and stay at home with or without their parent's knowledge. Some children tend to display characteristics of both school refusal and truancy.

Reed and Morizio's (2010) study on students with school refusal found that they also have a well-established history of truancy. The study revealed that these students tend to process information holistically. The research, therefore, indicates that the cognitive styles of many truants tend to differ from those of students who are not truants. The result further, implies that, if educators fail to accommodate the different cognitive styles in their teaching, escapist behaviour in the form of truancy is likely to occur.

In a study conducted on 144 students, Oliha, (2014) found significant differences in truant behaviour of students exposed to treatment strategies and those in the control group. Also, a significant difference existed in post-treatment truancy between students exposed to contingency management strategy and those exposed to cognitive restructuring (Oliha, 2014).

Statement of Problem

Truancy is a serious school problem which may affect school performance and may predict delinquent behaviour. A student who is continually absent from school is likely to perform more poorly in the school and eventually drop out of school. Absenteeism is a major concern to teachers, groups, parents and government. The researcher's inspection of attendance registers in some schools in Ekiti showed that there is no week the students' attendance recorded 100%, some recording 70% while some as low as 65% per week.

Purpose of the Study

The purpose of the study is to investigate the effect of cognitive restructuring technique in the management of truancy behaviour among secondary school students in Ekiti State, Nigeria.

Research Questions

The following research questions were raised for the study.

- (1) Would there be any difference in truancy reduction among students exposed to cognitive restructuring and those in the control group?
- (2) Would there be any difference in truancy reduction between male and female students exposed to cognitive restructuring therapy?
- (3) Would there be any difference in truancy reduction between rural and urban students exposed to cognitive restructuring therapy?

Hypotheses

- (1) There is no significant difference in truancy reduction between students exposed to cognitive restructuring and students in the control group.
- (2) There is no significant difference in truancy reduction between male and female students exposed to cognitive restructuring therapy.
- (3) There is no significant difference in truancy reduction between rural and urban students exposed to cognitive restructuring.

Methodology

The research used a 2x2x2 factorial design consisting of one treatment, a control group, gender and school location in terms of rural and urban. A sample of 144 truants participated in the study. The sample was drawn using a multistage sampling procedure consisting of simple and stratified random sampling from a pool of 868 students in Ekiti State who were prone to truancy behaviour out of 92,696 students in Ekiti State. Truancy prone students in the study are those students with 30% total attendance or lower in a school term.

The instrument for this research was a questionnaire of 30 items designed to measure truancy behaviour among secondary school students and tagged Self- Perception of Truancy Behaviour Questionnaire (SPTBQ). The questionnaire required the subjects to respond to the items on a 4-point Likert scale of “Strongly Agree”, “Agree”, “Disagree” and “Strongly Disagree” to indicate their disposition to some acts of truancy.

The participants were pre-tested with the questionnaire designed to measure truancy behaviour. Participants in the experimental group were subjected to cognitive restructuring treatment of six sessions of therapy namely; (a) general orientation (b) explanation on truancy, types and factors responsible for truancy (c) teaching of rational thinking process/overview of irrational assumption (d) explanation and identification of cognitive distortions (e) active teaching on rational school attendance behaviour and (f) general review. The control group received no treatment. Both groups were post-tested with the truancy questionnaire.

The participants’ responses were subjected to Analysis of CO-Variance (ANCOVA) and Multiple Classification Analysis (MCA).

Results

Results are presented in Tables below.

Hypothesis 1

There is no significant difference in truancy reduction between students exposed to cognitive restructuring and students in the control group.

Table 1: ANCOVA showing truancy reduction of students in the cognitive restructuring and students in the control groups

| <i>Source</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F_{cal}</i> | <i>F_{table}</i> | <i>P</i> |
|---------------------|-----------|-----------|-----------|------------------------|--------------------------|----------|
| Corrected Model | 36580.019 | 2 | 18290.010 | 35.902 | 3.04 | .000 |
| Covariate (Pretest) | 9519.769 | 1 | 9519.769 | 18.686 | 3.89 | .000 |
| Group | 32087.920 | 1 | 32087.920 | 62.986* | 3.89 | .000 |
| Error | 71832.203 | 141 | 509.448 | | | |
| Corrected Total | 108412 | 143 | | | | |

| Source | SS | df | MS | F _{cal} | F _{table} | P |
|---------------------|------------|-----|-----------|------------------|--------------------|------|
| Corrected Model | 36580.019 | 2 | 18290.010 | 35.902 | 3.04 | .000 |
| Covariate (Pretest) | 9519.769 | 1 | 9519.769 | 18.686 | 3.89 | .000 |
| Group | 32087.920 | 1 | 32087.920 | 62.986* | 3.89 | .000 |
| Error | 71832.203 | 141 | 509.448 | | | |
| Corrected Total | 108412 | 143 | | | | |
| Total | 1452466.00 | 144 | | | | |

*P<0.05 (Significant Result)

Table 1 shows that F_{cal} (62.986) is greater than F_{table} (3.89) at 0.05 level of significance. The null hypothesis is rejected. This implies that there is a significant difference in truancy reduction between students exposed to cognitive restructuring and students in the control group.

In order to determine the effectiveness of the treatment (therapy), Multiple Classification Analysis (MCA) was used. The result is presented in Table 2.

Table 2: Multiple Classification Analysis (MCA) showing truancy reduction of students in cognitive restructuring and control groups.

| Grand Mean = 96.61 | | | | | |
|-------------------------|----|------------------|------------------|--------------------------------------|------|
| Variable + Category | N | Unadjusted Devn' | Eta ² | Adjusted For Independent + Covariate | Beta |
| Cognitive Restructuring | 72 | -13.71 | 0.34 | -14.69 | .20 |
| Control | 72 | 13.71 | | 14.7 | |
| Multiple R | | | | | .204 |
| Multiple R ² | | | | | .041 |

Table 2 shows that students in the cognitive restructuring had better adjusted mean score of 81.92(96.61+ (-14.69)) than those in the control group with an adjusted mean score of 111.31 (96.61+14.7) on truancy reduction. This implies that the use of cognitive restructuring therapy is an effective therapy for reducing truancy among secondary school students in Ekiti State. The treatment accounted for 34% (Eta²=0.34) of the variance in truancy reduction among secondary school students in Ekiti State.

Hypothesis 2

There is no significant difference in truancy reduction between male and female students exposed to cognitive restructuring therapy.

In order to test the hypothesis, scores relating to truancy reduction of male and female students exposed to cognitive restructuring therapy were computed and compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result is presented in Table 3.

Table 3: ANCOVA showing truancy reduction of students in the cognitive restructuring group by gender

| <i>Source</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F_{cal}</i> | <i>F_{table}</i> | <i>P</i> |
|---------------------|------------|-----------|-----------|------------------------|--------------------------|----------|
| Corrected Model | 10627.601 | 2 | 5313.800 | 5.321 | 3.07 | .007 |
| Covariate (Pretest) | 10561.476 | 1 | 10561.476 | 10.576 | 3.92 | .002 |
| Sex | 1195.316 | 1 | 1195.316 | 1.197 | 3.92 | .278 |
| Error | 68904.719 | 69 | 998.619 | | | |
| Corrected Total | 79532.319 | 71 | | | | |
| Total | 574379.000 | 72 | | | | |

P>0.05

Table 3 shows that there is no significant difference in truancy reduction between male and female students exposed to cognitive restructuring therapy. ($F_{1,69}=1.197$; $P>0.05$). The null hypothesis is not rejected. This implies that there is no significant difference in truancy reduction between male and female students exposed to cognitive restructuring therapy.

Hypothesis 3

There is no significant difference in truancy reduction between rural and urban students exposed to cognitive restructuring.

Scores relating to truancy reduction of rural and urban students exposed to cognitive restructuring were computed and subjected statistical analysis involving Analysis of Covariance (ANCOVA) at 0.05 level of significance. The result is presented in Table 4.

Table 4: ANCOVA showing the difference in truancy reduction of students exposed to cognitive restructuring by location

| <i>Source</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F_{cal}</i> | <i>F_{table}</i> | <i>P</i> |
|---------------------|-----------|-----------|-----------|------------------------|--------------------------|----------|
| Corrected Model | 11274.762 | 2 | 5637.381 | 5.699 | 3.07 | .005 |
| Covariate (pretest) | 4410.749 | 1 | 4410.749 | 4.459 | 3.92 | .038 |
| Location | 1842.478 | 1 | 1842.478 | 1.863 | 3.92 | .177 |
| Error | 68257.557 | 69 | 989.240 | | | |
| Corrected Total | 79532.319 | 71 | | | | |

| <i>Source</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F_{cal}</i> | <i>F_{table}</i> | <i>P</i> |
|---------------------|------------|-----------|-----------|------------------------|--------------------------|----------|
| Corrected Model | 11274.762 | 2 | 5637.381 | 5.699 | 3.07 | .005 |
| Covariate (pretest) | 4410.749 | 1 | 4410.749 | 4.459 | 3.92 | .038 |
| Location | 1842.478 | 1 | 1842.478 | 1.863 | 3.92 | .177 |
| Error | 68257.557 | 69 | 989.240 | | | |
| Corrected Total | 79532.319 | 71 | | | | |
| Total | 574379.000 | 72 | | | | |

P>0.05

Table 4 reveals that there is no significant difference in truancy reduction between rural and urban students exposed to cognitive restructuring. ($F_{=1.69}=1.863$; $P>0.05$). The null hypothesis is not rejected. This implies that there is no significant difference in truancy reduction between rural and urban students exposed to cognitive restructuring.

Discussion

The findings of the study revealed that cognitive restructuring therapy was effective in reducing truancy among secondary students in Ekiti State. The result in Table 3 revealed that gender did not influence the effectiveness of cognitive restructuring. The result also showed that the location did not influence the effectiveness of cognitive restructuring. Ellis (2002) had proposed that cognitive restructuring is a therapeutic intervention which can help individuals to be aware of their irrational beliefs and when such beliefs are disputed the individuals will develop a more realistic way of thinking. Furthermore, the treatment might have helped the participants in this group identify and dispute their negative self-perception. For example, a child who performs poorly may think that the teacher hates him or failure to dress properly may make the student feel that others are making jest of him. The treatment given might have helped them to be more realistic in thinking. This is in support of finding of Adeyemi and Uwakwe (2014), that there was significant difference in the reduction of truancy behaviour of participants exposed to cognitive restructuring technique and those in control group.

More so, the study revealed that there was no significant difference in truancy reduction between male and female students exposed to cognitive restructuring techniques. The implication of this is that gender does not influence the effectiveness of cognitive restructuring technique. The study also indicated that there was no significant difference in truancy reduction between rural and urban students exposed to cognitive restructuring technique. This implies that the school location does not influence the effectiveness of cognitive restructuring technique. The possible reason could be that both groups equally appreciated the value of education. People in Ekiti irrespective of gender and location had come to realize the value of education even as early as 1950's when free primary education was introduced and the incentives to attend school in irrespective of gender had been the same and also have continued to be provided by the successive governments in the state. Therefore, any form of intervention to reduce truancy or to increase school attendance could work equally irrespective of gender and location.

Conclusion

The findings of the study have led to the conclusion that cognitive restructuring technique was effective in truancy reduction among secondary school students. Both male and female students had a change in truancy after exposed to cognitive restructuring therapy. However, gender and school location did not influence the effectiveness of cognitive restructuring technique

Recommendations

On the basis of the findings the following recommendations are made:

1. School psychologists, school counsellors and teachers could adopt the cognitive restructuring to assist secondary school students to promote school attendance.
2. Teachers should keep an accurate record of students' attendance and refer those with irregular attendance to school psychologists and school counsellors for psychological interventions.
3. Parents should play an important role in monitoring their children in school and report any irregularity seen in them to school psychologists and school counsellors.

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National Educational Technology Standards for Students (NETSS): ICT Effectiveness for Pre-Teachers' Training on Instructional Delivery

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ABSTRACT

The research was carried out to determine the effectiveness of Information Communication and Technology (ICT) as compared against the National Educational Technology Standard for Students (NETSS) which was originated in Washington DC, United States by David Monursund used among the pre-service teachers in the Faculty of Education, University of Ibadan, Nigeria. In the study, four research questions were raised and answered using the descriptive statistics. The literatures established the importance of ICT and its role in the 21st century. A total sample of 500 pre-service teachers were randomly selected out of the total population of the Faculty of Education, University of Ibadan. Descriptive research design of survey type was used and the instruments for data collection were 52 items questionnaire tagged; Pre-Service Teacher and ICT in University of Ibadan (PsTICTUI). Findings revealed that pre-service teachers displayed high level of skills in ICT compared to NETSS and thus educational technology course is relevant in the preparation of Pre-service teachers.

Keynote: Technology standard, ICT, Instructional delivery, Pre-service teachers, Effectiveness

INTRODUCTION

It is well known that the quality and extent of learner achievement are determined primarily by teacher competence. This is the reason for establishing teacher education programmes, to prepare and equip teachers for competence. The National Council for Teacher Education, NCTE, (1995) defined teacher education as a programme of education, research and training of persons to teach from pre-primary to higher level of education. To establish quality of teachers that would facilitate learning in the learner, then the place of ICT training is highly required. For this reason, the participants in such programme must have adequate knowledge of ICT course, which may be categorized under Educational Technology. The role of educational technology as a course in teacher education programme is to inculcate skills that would put teachers in a place whereby, they may be able to make learning more achievable. It can be deduced that technology has been part of teacher education since inception though it may be different from what is obtainable today. It is a necessity in this age that pre-service or in-service teachers must be compliant with the use of tools which enhances teaching-learning process.

National Policy on Education (NPE, 2004) recognizes the fact that educational technology course should be offered in higher institutions as it is in other climes of the world. Federal Republic of Nigeria FGN (2018) outlined the expectation of the nation as regards the teachers to be and how he/she is going to be fit into the vision. The FRN (2018) expressly states that teachers must be able to deploy Information and Communication Technology (ICT) in the process of teaching and learning. Moreover, ICT have become very important in all aspects of education. For the past twenty years, the use of ICT has

fundamentally changed the practices and procedures of education. This cannot be limited to a particular field as the innovation and use of ICT is widely embraced by all disciplines among nations.

However, it will make sense at this level to familiarise the intended teachers to a workshop where ICT tools can be used as described by the National Educational Technology Standard within six manageable steps.

- Analyse the benefits that the overall student's achievement would meet in ensuring those standards in lesson plan. The curricular objectives must be able to achieve a new skill before progressing to the next step. The expectation is that teacher should adopt technology in the project needs and goal.
- Start Brainstorming the multidiscipline lesson plan on ground individually or collectively with those colleagues that are experienced technology users. In this regard webbing is a tool that can be used to build a central topic and subtopic respectively in a related idea to create a visual map with webbing software
- Map the project selected earlier that contains ideas, concepts and lesson plan activities. It is also important that teachers should possess information and skills needed to select the software and hardware to complete the plan's tasks and produce the end product.
- Creating the teaching template can be a difficult task in planning a new technology project. It is best done by initiating a sample project through modelling. Ideally, teachers should not bypass this step. If properly followed the lesson plan would be successful.
- Develop assessment tools with new mind that reflects the skills and information that the students would be responsible to demonstrate in their project in the lesson plan. Assessment is expected to contain the weight of grammar, spelling, content, specific technology skills, layout and presentation.
- Evaluation mode is an essential ingredient to determine the resource or technology that are missing or unnecessary. It will reflect the process of using technology to achieve the lesson's objective (Laura, 2017)

Thus, the implication is that teacher education has to adapt these six steps in educational technology course so that pre-service teachers would meet up with the requirement of 21st century teacher's expectation.

Thorpe (2013) asserts that ICT is very important in our day-to-day teaching activities. Thus, education cannot do without technology and technology is referred to as one of the basic building blocks of modern society. In other words, there is a link between technology and other aspects of the society which is education. Many countries now regard understanding of ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy (NCTE, 1995). The objectives is to achieve planned and coordinated development of teacher education throughout the country. To regulate and properly maintain the norms and standards in the teacher education system and for matters connected therewith among others. Thus, the level of pre-service teacher's basic operations and concepts according to the National Educational Technology Standards refers to the use of skills and concepts which pre-service teachers are expected to be proficient in order to make learning possible. Level of pre-service teachers' understanding of social, ethical, and human issues is very important as

technology connects pre-service teachers to diverse of learners. Every pre-service teacher is expected to be aware of issues that surrounds the use of educational technologies which may hinder or enhance learning. It is not a gainsaying that pre-service teachers use telecommunication tools to collaborate, publish, interact with peers, experts using varieties of media and formats to larger audience including the use of technology in locating, evaluating, collecting, processing and reporting research among pre-service teachers.

Furthermore, it is assumed that the use of technology improves critical thinking, problem solving and decision making among pre-service teachers. Rogers, (2015) asserts that field of education has been affected by ICTs, which has undoubtedly affected teaching, learning, and research. It is noticeable that some practices in education has become dependent on the use of ICT for easy, effective and efficient result. It is not only teaching and learning that are affected, it also affects how research are being carried out. A great deal of research has proven the benefits to the quality of education (Ryan, 2010). ICTs have the capacity to innovate, speed up, enrich, deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's teachers, as well as strengthening and enhancing education. Thus, the use of ICT in teaching and learning process empower the students for the future workforce. Education technologists in the United States of America documented a consensus defining what students needed to know and able to do with technology.

The standards, used in every United States region and many countries of the world are credited by most significantly influencing expectations for students and creating a target of excellence relating to technology (Wells and Lewis 2006). This standard is very important to both teachers as it provides basis for knowing what they can do, what skills they possess and what ways it must manifest. Most importantly, it helps every teacher to evaluate himself not against others but against the standard. It affords every teacher to know the skills that are important as profession of teaching is concerned. The pursuit of this makes it a challenge and those skills is good but becomes problem as many teachers were not used to teaching and learning with technology, however, the study sought to address the levels of teacher's basic operation, understanding of social, ethical and human issue in enhancing the productivity in the use of ICT tools in preparation of pre-service teachers. In 2006, International Society for Technology in Education (ISTE) began work on the next generation of National Educational Technology Standard for Students,

Specifically, it addresses creativity and innovation, communication and collaboration, research and information fluency; critical thinking, problem-solving and decision-making, digital citizenship, and technology operations and concepts. It is a known fact today that the world thrives on creativity. This affords the world to see new machines, tools and ideas in the way things are done. This can also be seen in education as many tools are now been introduced in teaching-learning process. For instance, google classroom, schoology, slide share, Edmodo etc. are all product of creativity and innovation.

Likewise, communication and collaboration, research and information fluency cannot be over emphasized in the 21st century teaching, learning and research. This is done by the use of communication channel of human interaction which helps to facilitate sharing of ideas and enhance research among students and academics through collaboration. Critical thinking, problem-solving and decision-making cannot be separated from education of teachers, that is why it is very important to include such a course that helps to stimulate and triggers thinking which enable informed decision to be taken and result to problems solving. This type of education is to prepare teachers to be thinkers. This leads to preparation of digital citizens who are proficient in the use of tools for both learning and teaching and can evaluate the best among many and the same time respects people of different races and encourage cooperation. In summary, teachers must be able to understand basic technology operations and concepts which would makes them digital teachers that students could look up to in guiding and proffering solutions to issues with the use of educational technology.

Michael (2009) states that much has been said and reported about the impact of technology, especially computers in education. Initially computers were used to teach computer programming but the development of the microprocessor in the early 1970s saw the introduction of affordable microcomputers into schools at a rapid rate. Computers and applications of technology became more pervasive in society which led to a concern about the need for computing skills in everyday life. Culp, Honey, & Mandinach (2005) claim that ICTs have been utilized in education ever since their inception, but they have not always been massively present. Although at that time computers have not been fully integrated in the learning of traditional subject matter, the commonly accepted rhetoric that education systems would need to prepare citizens for lifelong learning in an information society boosted interest in ICTs.

National Policy on Education (NPE, 2013) serves as an important factor which determines the direction of and regulation of education. Hence, it can be assumed that the basis, scope, expectation and standards that teachers are expected to meet can be found in the said document. NPE recognizes the fact that no teacher can perform better without having recourse to technology as resource and mentoring and other needed supports could be found in what technology has to offer both offline and on-line. Having laid the background for the expectation of pre-service teachers, it is on this note that the implication of non-implementation of National Educational Technology Standard for students may spell doom for our education in the area of skills which supposed to facilitate learnings.

There have been needs to equip teachers with educational technology skills which will help them in the delivery of teaching and learning in compliance with what today's society demands. Based on this premise, the alignment of ICT and educational technology course being offered in the Faculty of Education, University of Ibadan with the National Educational Technology Standards for Students (NETS-S 1998) would be assessed. This would reveal some gaps that exist in the teacher preparation programme.

METHODOLOGY

The research design adopted for the study is expo-facto of descriptive survey design. The descriptive design is use when the researchers are trying to describe certain characteristic in the population with the sample. This study described the level of teacher's basic operation in enhancing the productivity in the use of ICT tools among pre-service teachers in the Faculty of Education, University of Ibadan. The population for this study consists of all pre-service teachers of the Faculty of Education, University of Ibadan. Random sampling technique was used to select participant for the study, the total of 500 students were randomly and purposively selected in six departments from Faculty of Education and these were taken from two educational levels (200 and 300Level students) they were selected because they were at the stage of their teaching practice

Table1. Distribution among Departments and Levels

| S/N | Department | 200 Level | 300 Level | Total | Reason |
|--------------|--|-----------|-----------|------------|-------------------------------|
| 1 | Adult Education | 30 | 36 | 66 | Experienced Teaching Practice |
| 2 | Arts and Social Science Education | 40 | 23 | 63 | Experienced Teaching Practice |
| 3 | Early Childhood and Educational Foundation | 23 | 25 | 58 | Experienced Teaching Practice |
| 4 | Guidance and Counselling | 30 | 35 | 65 | Experienced Teaching Practice |
| 5 | Human Kinetics and Health Education | 27 | 26 | 53 | Experienced Teaching Practice |
| 6 | Library Archival and Information Studies | 20 | 30 | 50 | Experienced Teaching Practice |
| 7 | Science and Technology Education | 25 | 48 | 73 | Experienced Teaching Practice |
| 8 | Social Works | 12 | 30 | 42 | Experienced Teaching Practice |
| 9 | Special Education | 18 | 12 | 30 | Experienced Teaching Practice |
| Total | | | | 500 | |

This study would be guided by the following research questions:

1. What is the level of pre-service teacher's basic operations, educational technology and ICT instructional design model according to the National Educational Technology Standards?
2. What is the level of pre-service teachers understanding of social, ethical, and human issues?
3. What is the relationship between educational technology course and enhancement of productivity in the use of ICT tools?
4. What is the level of pre-service teacher use of telecommunication tools to collaborate, publish and interact with peers, experts using varieties of media and formats to multiple audiences?

Research Question 1

What is the level of pre-service teachers on basic operations, educational technology and ICT instructional design model?

Table 2. Level of Pre-service Teachers on Basic Operations and Concept

| N/o | Items | SA | A | D | SD | Mean | Std. Dev |
|-------------------------|---|------|------|-----|-----|-------------|----------|
| 1 | I understand the meaning of ICT instructional design model in educational technology. | 46.4 | 48.2 | 3.6 | 1.8 | 3.46 | 1.516 |
| 2 | Technology in education is the adoption of technologies outside education for learning Purpose. | 33.5 | 54.7 | 8.4 | 3.4 | 3.18 | 0.723 |
| 3 | I find the use of technology (tools) in education easy in the process of learning. | 46.0 | 48.8 | 4.8 | 0.4 | 3.40 | 0.602 |
| 4 | Having gone through media course such as TEE202, it helps me to understand some basic tools such as wikis, Edmodo, Thinglink etc. | 46.3 | 46.3 | 5.8 | 1.6 | 3.37 | 0.669 |
| 5 | Simulation (virtual life situation) brings activities to my full understanding. | 45.5 | 47.3 | 5.1 | 2.2 | 3.36 | 0.676 |
| 6 | I use technology (Google search, Edmodo, Bing) to solve academic problems by myself. | 52.8 | 42.8 | 3.6 | 0.8 | 3.48 | 0.608 |
| 7 | Knowledge gained in educational technology course helps me to solve other technology related problems. | 38.4 | 51.3 | 8.9 | 1.4 | 3.27 | 0.677 |
| Weighted average | | | | | | 3.36 | |

Table 2 above shows the level of pre-services teachers understanding on basic operations and concepts, the result revealed that 94.6% of the respondents agreed that they understand the meaning of ICT instructional design model in educational technology while 5.4% disagreed (mean=3.46, SD=1.52). This may be due to adequate instruction received in the educational technology course before the research was carried out. More so, 92.6% of the respondents also agreed that they have gone through media course such as TEE 202, that it helps them to understand some basic tools such as wikis, Edmodo, Thinglink etc. while 7.4% disagreed (mean=3.40, SD=0.669), of the respondents agreed the understanding of tools might have been so possible because the students were introduced to tools earlier on. 92.8% of the respondents agreed that Simulation (virtual life situation) brings activities to their full understanding while 7.2% disagreed (mean 3.36, SD=0.676) the instruction received earlier showed that the students understood virtual life concept of learning. 95.6% agreed that they use technology (Google search, Edmodo, Bing) to solve academic problems by themselves while 4.4% disagreed (mean 3.36, SD=0.608).

Pre-service teachers' responses showed that they understood basic operations. 88.2% of the respondents agreed that technology in education is the adoption of technologies outside education for learning purpose while 11.8% disagreed (mean 3.48, SD= 0.723), the understanding of pre-service teacher was tested in determining the understanding of concepts of technology in education and they scored very high. However, pre-services teacher disagreed on it. 94.8% of the respondents agreed that they find the use of technology (tools) in education easy in the process of learning 5.2% disagreed (mean3.18 SD=0.602), the pre-service teachers disagreed on the finding that use of technology is very easy which may be due to challenges such as inability to have a personal system which hinder practices and 92.8% of the respondents agreed that Knowledge gained in educational technology course helps them to solve other technology-related problems while 10.3 disagreed (mean3.27=SD 0.677). The pre-service

teacher disagreed by saying knowledge gained has not been of help in solving other technological related problems.

Research question 2. What is the level of awareness of ethical, human and social issues in the use of technology?

Table 3 Level of Pre-service Teachers on Social, Ethical and Human Issues in the Use of ICT

| N/o | Items | SA | A | D | SD | Mean | Std. Dev |
|-----------------------|--|-------|------|------|------|-------------|----------|
| 1 | I try to manage my digital identity and reputation well in the digital world to prevent bad image. | 42.3 | 52.5 | 4.8 | 0.4 | 3.37 | 3.00 |
| 2 | I reference and respect the use of intellectual property when writing my own work. | 33.7 | 59.4 | 5.4 | 1.5 | 3.26 | 3.00 |
| 3 | I reference and respect the use of intellectual property when sharing another person's publication. | 44.4 | 46.3 | 8.1 | 1.2 | 3.34 | 3.00 |
| 4 | When I use ICT, I'm conscious of the rules guiding the technology. | 36.0 | 51.8 | 9.6 | 2.6 | 3.21 | 3.00 |
| 5 | I engage in positive behaviour when using ICT on online and offline | 47.2 | 47.8 | 3.2 | 1.6 | 3.41 | 3.00 |
| 6 | I engage in safe behaviour (keeping my personal data secured) when using ICT including social interaction Online | 44.2 | 48.2 | 4.0 | 3.6 | 3.34 | 3.00 |
| 7 | I demonstrate an understanding of and respect the right of others when using ICT | 40.0 | 49.9 | 9.3 | 0.8 | 3.29 | 3.00 |
| 8 | I use ICT to share untrue information which cannot be verified. | 23.4 | 30.4 | 20.4 | 25.8 | 2.51 | 3.00 |
| 9 | I know how to manage my personal data to maintain privacy | 47.3 | 46.7 | 5.0 | 1.0 | 3.40 | 3.00 |
| 10 | I'm conscious of other people's feelings when I use social media | 38.8 | 51.0 | 8.8 | 1.4 | 3.27 | 3.00 |
| 11 | I manage my personal data to prevent breach of my personal security | 43.5 | 48.8 | 5.7 | 1.8 | 3.40 | 3.00 |
| 12 | I am aware of data collection technology used to track navigation online | 28.0 | 48.8 | 19.0 | 4.2 | 3.01 | 3.00 |
| 13 | Sometimes, I make jest of someone in bad manner. | 018.6 | 26.6 | 29.3 | 25.2 | 2.44 | 2.00 |
| 14 | I do bully people if they do not respect my Feelings | 16.9 | 19.5 | 29.5 | 34.1 | 2.19 | 2.00 |
| Weighted score | | | | | | 3.10 | |

The table 3 above show the level of pre-service teachers understanding and, awareness of ethical, human and social issues in the use of ICT. The result revealed that 95.8% of the respondents agreed that they try to manage their digital identity and reputation well in the digital world to prevent bad image while 4.2% disagreed (mean 3.37, SD=3.00). The responses were positive as many agreed to maintain good reputation as a result of possessing good knowledge of societal demands. 93.1% of the respondents agreed that they reference and respect the use of intellectual property when writing their own work while 6.9% of the respondents disagreed (mean 3.26 SD=3.00). Pre-service teachers attested to the fact that they always reference their work. 90.7% of the respondents agreed that they reference and respect the use of intellectual property when sharing another person's publications while 9.3 disagreed (mean 3.34, SD=3.00).

Again, it was revealed that reference is always adhered to in the sharing of another person's publication. 87.8% of the respondents agreed that when they use technology, they are conscious of the rules guiding the technology while 12.2% disagreed (mean 3.21, SD=3.00). It was shown here that pre-service teachers are aware of the rules guiding the use of ICT. 95% of the respondents agreed that they engage in positive behaviour when using ICT online and offline 5% disagreed (mean 3.41, SD=3.00). The level of positive behaviour been displayed by the respondents is very high compared to the mean. 92.4% of the respondents agreed that they engage in safe behaviour keeping their personal data is secured when using ICT including social interaction on-line while 7.6 disagreed (mean 3.34 SD=3.00). The respondents showed high level of security based on understanding of rules they have been exposed to in TEE 202. 89.9% of the respondents agreed that they can demonstrate an understanding of and respect the right of others when using technology while 10.1% disagreed (mean 3.29, SD=3.00).

The research indicates that respect for others is rated very high among the pre-service teachers. 94% of the respondents agreed that they know how to manage their personal data to maintain privacy while 6% disagreed (mean 3.40, SD=3.00). The respondents agreed that they always protect their privacy in the use of ICT. 59.8% of the respondents agreed that they are conscious of other people's feelings when they use social media while 10.2 disagreed (mean 3.27, SD=3.00). Concerned human issues, pre-service teachers scored high by asserting that others feelings are respected. 92.3% of the respondents agreed that they manage their personal data to prevent breach of their personal security while 7.7% disagreed (mean 3.40, SD=3.00). The responses were high in favour of the fact that they managed their personal data, this may be attributed to knowledge of cybercrimes. However, respondents agreed on 76.8% that they are aware of data collection technology used to track navigation online while 23.2% disagreed (mean 3.01, SD=3.00).

This may be due to lack of understanding of how this could be possible. 45.2% agreed that they sometimes make jest of someone in bad manner while 54.8% disagreed (mean 2.44, SD= 2.00). This may be as a result of high level of social and human related issues. 36.4% of the respondents agreed that they do bully people if they do not respect their feelings while 63.6 disagreed (mean 2.19, SD= 2.00). This may be due to the fact that, this type of behaviour is not accepted in the society in which people maintain strong affiliation. 53.8% of the respondents agreed that they use ICT to share untrue information which cannot be verified while 46.2 disagreed (mean 2.51, SD=3.00). Pre-service did not agree on spreading false information since their image and social relation ranks very high which they would like to protect.

Research question 3: What is the level of the use of ICT Productivity Tools in enhancing, increase productivity, promote creativity, collaboration in constructing technology enhancing model, preparing publications and other creative works.

Table 4. Level of Pre-service Teachers on ICT Productivity Tools (Edmodo, Schoology, Google classroom etc)

| N/o | Items | SA | A | D | SD | Mean | Std. Dev |
|-----------------------|--|------|------|------|------|-------------|----------|
| 1 | I can use ICT to aids learning. | 43.3 | 49.4 | 5.7 | 1.4 | 3.43 | 1.942 |
| 2 | The use of ICT helps me to do more work compared to manual method. | 38.0 | 53.0 | 7.6 | 1.4 | 3.28 | 0.662 |
| 3 | I cannot use ICT productivity tools, such as Thing link creatively. | 23.7 | 38.1 | 29.2 | 9.1 | 2.76 | 0.915 |
| 4 | I can only use Ms-Word for typing and editing my assignments and project, not for any other design work. | 25.3 | 39.4 | 23.4 | 11.9 | 2.78 | 0.958 |
| 5 | Use of technology tool (WhatsApp) helps me to collaborate with others in constructing technology-enhanced models | 37.8 | 48.7 | 9.3 | 4.0 | 3.26 | 1.544 |
| 6 | The use of ICT tools (Google search) help me to collaborate with others in preparing publication. | 39.1 | 51.0 | 8.1 | 1.8 | 3.27 | 0.686 |
| 7 | I use ICT to produce other creative works such as drawing etc. | 39.7 | 44.1 | 12.7 | 3.5 | 3.20 | 0.792 |
| Weighted score | | | | | | 3.14 | |

The level of pre-services teachers understanding on ICT Productivity Tools (Edmodo, Schoology, Google classroom etc). The result revealed that 92.7% of the respondents agreed that they can use ICT to aids learning while 7.3 disagreed (mean 3.43, SD=1.942). The replies of the respondent were high compared to the mean; this established their competence in the use of tools for teaching learning processes. 91% of the respondents agreed that the use of ICT helps them to do more work compared to manual method while 9% disagreed (mean 3.28, SD=0.662). This implies that more work is done with the use of ICT rather than using manual. 86.5% of the respondents agreed that use of technology tool (WhatsApp) helps them to collaborate with others in constructing technology-enhanced models while 13.5% (mean 3.26, SD=1.544).

This implies that communication tool such as WhatsApp is for teaching-learning resource. 90.1% of the respondents agreed that the use of ICT tools (Google search) help them to collaborate with others in preparing publications while 9.9% disagreed (mean 3.27, SD=0.686). Through tools such as google materials are easily sought. 83.8% of the respondents agreed that they use ICT to produce other creative works such as drawing etc. while 6.2% disagreed (mean 3.20, SD=0.792). However, pre-service teachers agreed that 61.8% of the respondents cannot use productivity tools, such as Thinglink creatively while 38.2 disagreed. (mean 2.76, SD=0.915). This may be due to lack of enough time to have hand on task. Lastly, 64.7% of the respondents agreed that they can only use Ms Word for typing and editing their assignments and project, not for any other design work while 35.3 disagreed (2.78, SD=0.598).

Research question 3: What is the level of pre-service teacher use of telecommunication tools to collaborate, publish, and interact with peers, experts using varieties of media and formats to multiple audiences?

Table 5. Level of Pre-service Teachers on Technology Communication Tools (Facebook, WhatsApp, BBM)

| N/o | Items | SA | A | D | SD | Mean | Std. Dev |
|-----------------------|--|------|------|------|-----|-------------|----------|
| 1 | If I belong to a group of learners, I can use BB to share my ideas toward the group's project for others to assess. | 43.0 | 43.8 | 9.3 | 3.9 | 3.26 | 0.782 |
| 2 | If I need to communicate an idea to my colleagues, but what I intend to use is not functional, I can use another communication tool. | 32.8 | 55.3 | 9.5 | 2.4 | 3.18 | 0.698 |
| 3 | I only know how to use some common communication tools; I can't explore others. | 24.8 | 39.4 | 26.9 | 8.8 | 2.80 | 0.913 |
| 4 | I can use communication tools to share or contribute my ideas with members of the society, even if they are not known to me. | 34.4 | 48.5 | 8.5 | 4.6 | 3.21 | 0.783 |
| 5 | Communicating my ideas with peers and experts is easily done with common apps like WhatsApp. | 51.9 | 37.2 | 6.5 | 4.3 | 1.35 | 4.926 |
| Weighted score | | | | | | 2.76 | |

Level of Pre-service Teachers on the use of Technology Communication Tools (Facebook, WhatsApp, BBM). The result revealed that 86.8% of the respondents agreed that If they belong to a group of learners, they can use BB to share my ideas toward the group's project for others to assess 13.2% disagreed (mean 3.26, SD=0.782). The responses were very high against the benchmark and this shows the level of uses by the pre-service teachers 88.1 % of the respondents agreed that If they need to communicate an idea to their colleagues, but what they intend to use is not functional, they can use another communication tool while 11.9 % disagreed(mean 3.18,SD=0.698). This implies that pre-service teachers are competent in the use of other technologies. 82.9 % of the respondents agreed that they only know how to use some common communication tools, they can't explore others while 17.1% (mean 2.80,SD=0.913) 57 % of the respondents agreed that they can use communication tools to share or contribute their ideas with members of the society, even if they are not known to them while 33% disagreed (mean 3.21, SD=0.783) 89.1% of the respondents agreed that communicating their ideas with peers and experts is easily done with common apps like WhatsApp while 10.9% disagreed (mean 1.35, SD=44.926)

Discussion of findings

It was discovered that the level of pre-service teachers on basic operations, educational technology and ICT instructional design model was high compared against the mean score. This was against the study conducted by Blankson, Keengwe., & Kyei-Blankson, (2010) that despite pre-service teachers taking at least three credit hours related to generic technology skills, this has not resulted to application of technology or has it prepared teachers to use technology. This may be so because of difference between the two set of pre-service teachers which was dictated by different level of basic operation. Also, pre-service teachers were able to show high level of understanding of social, ethical and human issues as regard the use of ICT this may be due to high level of the use of internets and being digital native and that the environment is tied to social values promoted by culture and norms.

Moreover, the pre-service show very high level of compliance with the use of ICT productivity tools as pre-service rated very high in all items against the mean score. Rogers, (2015) findings indicated that participants had a medium level internet use, Web 2.0 awareness, Web 2.0 use and Web 2.0 skills while their educational Web 2.0 use level was low. But difference emerges in terms of competencies on certain Web 2.0 tools, their blog, wiki and podcast competencies were at a very low level, whereas their social networking and YouTube competency levels were high. Findings also showed that there were significant relationships between pre-service teachers' Web 2.0 competencies and their critical thinking disposition. This may be so due to the fact that 68.2% of the pre-service teachers are between ages 16-24 which have been regarded as digital native.

It was also shown that pre-service teachers were rated high in the use of communication tools such as Facebook, WhatsApp etc. This was corroborated by the WCETR-2014, in regard to social media applications, teachers and students use WhatsApp as a main tool with 100% for teachers and almost 73% for students. Both teachers and students are willing to use social media (communication tools) in education, and they believe it will enhance their educational experiences but the significant is very low. In deployment of tools for research pre-service teachers were rated very high against the mean score. This was supported by the Wells, & Lewis, (2006). that internet use and accessing the web was the most commonly used technology in social studies while word processing and accessing the web were the most frequently used technologies in the 42 social studies work samples, as well as the other subject area work samples in the studies.

CONCLUSION

The study aimed at appraisal of pre-service teacher's quality against national educational technology standard for students (NET.S) the level of effectiveness of educational technology of 200 and 300 level students of Education, University of Ibadan. From the findings the following conclusions were drawn: Pre-service teachers should use technology in learning process, Pre-service teachers should use technology to teach at all level to enhance education technology within the Faculty of Education.

RECOMMENDATIONS

The National Policy on Education (NPE) postulated that "FRN (2018) outlined the expectation of the nation as regards the teachers to be and how they are going to be fit into the vision. The NPE expressly states that teachers must be able to deploy ICT in the process of teaching and learning process. Based on the proceeding's conclusion, the following recommendations were made: -

1. Pre-service and in-service teachers should be equipped with educational technology through theory and practice.
2. Students should experience innovative technology-supported learning environments in a social and ethical manner in teacher education programme.
3. ICT in education should be introduced in context.
4. ICT should be infused into the entire teacher education programmer to increase productivity in teaching and learning

Conclusively, pre-service teachers are expected to use skills acquired from educational technology from time to time as the need arises to develop more skills as practice makes perfections.

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School Administrators and Teachers' Adoption of ICT: Panacea for Effective Secondary School System in Uganda

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ABSTRACT

Secondary school education system is central to the human development of any nation and the advent of ICT elevates the notion. Numerous challenges hinder the integration of ICT to enhance administration and other deliverables at the secondary school level in Uganda. In view of the foregoing, therefore, this paper examines ICT needs of school administrators, teachers and the learners in enhancing the educational system in Uganda. Stakeholders' commitment and dedication to solving the identified challenges toward using ICT, will entrench and promote positive perception and behaviour among secondary school administrators and teachers in Uganda. ICT-enhanced learning brings the world into the classroom - employing the different types of learning approaches, improving the cognitive ability of students, hence concretizing and maximizing learning. The introduction of a framework and policies with measures put in place to monitor strict compliance of ICT integration in secondary schools is expected to have positive influence on the quality of instruction delivered to students. It will also promote ICT literacy and competency among teachers and administrators. Important as well, the ICT framework and policies will address staff development schemes for both the teachers and school administrators in order to keep up with currency in the concept of Technology Integration. This paper further suggests and recommends a large-scale implementation of ICT integration in the Ugandan secondary school system such that students are equipped with the necessary knowledge and skills needed to favourably compete in this 21st century global market demands.

Keywords: School Administrator, Teacher Adoption, ICT, Secondary School, Uganda

INTRODUCTION

The advent of technology-enhanced education has promoted the integration of Information and Communication Technology (ICT) into instructional delivery across various educational systems of the world (Puentedura, 2010). Although ICT is taught as a subject in all secondary schools in Uganda (Murungi, 2018), it is yet to be comprehensively adopted as the standard mode of instructional delivery in secondary schools. Consequently, the quality of instruction received by the students is not yet connected to the country's growth needs. Therefore, the institutionalization of Information and Communication Technology as the major instructional delivery system in secondary schools in Ugandan will concretize learning and make teaching more effective as well as enhance administrative management of the school

system This would be a worthwhile vision for Uganda's secondary school education (Tusiime, Johannesen & Gudmundsdottir, 2019; Ugandan Communications Commission, 2014).

Today, many of the students who complete secondary education in Uganda cannot be admitted into competitive tertiary institutions. Many secondary school leavers lack the requisite 21st century ICT skills (Kisakye, 2015) and rarely attain gainful employment. These, otherwise brilliant individuals, fail to contribute meaningfully to national growth and live impoverished lives. This could be attributed to the successive effect of the poor systemic education acquired across kindergarten, primary and secondary schools. The Ugandan students are, sadly, routinely prepared to live in a world that no longer exists. The education system has not fully embraced the inevitable need to integrate ICT into the school system. Yet, world over, students are prepared in an environment that leverages the most up-to-date ICT devices. ICT is here to stay and to radically redefine learning, work and the economy as we know it (Powell & Shellman, 2004). In most African countries, especially in Uganda, the leaders are still playing catch-up. For example, as at 2012, Uganda did not have a comprehensive ICT policy to meet needs in education and other sectors (Kaahwa & Muhumuza, 2018; Kisakye, 2015).

In earlier years of its establishment, the National Information Technology Authority (NITA) had only been concerned with helping government ministries, agencies and departments to be more ICT savvy - and neglected the education system, most especially, the schools. In recent years, though, the Ministry of Education and related agencies have emphasized the need for ICT integration in secondary schools (Uganda Communications Commission, 2014). The Ministry of Education and Sports, the agency in-charge of education in the country, has made attempts to facilitate the integration of ICT in secondary schools. However, these efforts are like a drop in the ocean. The school authorities, themselves, have not embraced the need for ICT integration as fast as it requires. Similarly, majority of teachers are ill-equipped for the ICT revolution in schools (Malaba, 2012). Some still find the integration of ICT as a negative disruption to the status quo.

Furthermore, most parents in Uganda lack the financial ability to support ICT learning at home. The majority of the students are computer illiterate by the time they join secondary school. This presents an uphill task to teachers in helping the students to learn with ICT in secondary schools. In the drive to enhance school administration and teaching effectiveness using ICT, there are several technology integration models to be utilized including the Diffusion of Innovation Theory, Technology Acceptance Model, Unified Theory of Acceptance of Use of Technology, and Theory of Reasoned Action (Dibra, 2015; Kartama & Sarinastiti, 2017; Marangunić & Granić, 2015; Nemutanzhela & Iyamu, 2015). The Diffusion of Innovation Theory speaks of a gradual adaptation of technology over time and the Technology Acceptance Model depends on perceived ease of use (PEoU) and perceived usefulness (PU) (Dwivedi, Rana, Jeyaraj, Clement & Williams, 2019; Doane, Kelley & Pearson, 2016; King & He, 2006; LaMorte, 2016).

In view of the foregoing, this paper highlights the benefits and advantages of integrating ICT in educating secondary school students with regard to self-actualization and national growth in Uganda. There will be no credible motivation for undertaking such an expensive venture until the key players grasp its vast innate value. The discussion of this paper therefore focused on how the key players will work to integrate ICT in secondary school education in order to create an effective learning environment in Uganda.

Concept of Information and Communication Technology (ICT)

Technology-enhanced education system has enjoyed reasonable acceptability among stakeholders in the education disciplines across the world. ICT refers to the various technologies, tools and software used to gather, keep, transform and transmit information in a variety of forms. Hence, by implication, ICT is the intelligent system that leverages digital, cyber, electronic, magnetic, and related tools to achieve desired messaging or connection tasks and goals. These tasks and goals are initially set by human inventors to meet general or specific needs of the end user or ICT beneficiary (Alemu, 2015). The end users have also been seen to modify the original intentions of the technology to meet the unique needs or fit the systems at hand. ICT is therefore organic in nature in which a tool or system typically builds on another to improve the service required. This organic nature of ICT finds its limitations in part from the strict patent and intellectual property rights in society. The ICT system leverages the inherent desire for the human being to know and to connect with one another and the environment. Knowingly or not, the creators of ICT set in motion a cycle of relationships knitted in the web of varying users of the technology (Kayiwa Shafik Juma, Raihan & Clement, 2016; Singh, 2003; Webster & Murphy, 2008).

Integration of ICT therefore, requires the users to develop the necessary communication skills in addition to other requisite competences. ICT basically relies on not just the innovation and technical skills of its creators, but also those of the end users. For example, an individual should be able to manipulate various digital equipment, web pages, applications, etc. to accomplish the intended tasks and where possible, to enrich the quality of task. ICT is only as useful as the competence of the end user. This issue is normally solved by availing digital or hardcopy manuals or a set of instructions to guide the users to effectively interact with a specific ICT tool. That is why ICT and literacy ought to go hand in hand. ICT presupposes that the end user can read, in the appropriate dialect, the information that facilitates the effective use of the technology. Effective teaching with ICT in secondary schools means that the teacher is equipped with the appropriate technological, pedagogical and content knowledge in ICT as highlighted in the TPACK framework (Koehler, & Mishra, 2009). As seen already, ICT does not exist in isolation. It exists to solve real problems. In this regard, it is a response to the ever-changing needs of humanity. In meeting the needs, ICT in general enhances convenience, efficiency and effectiveness (Leask, 2013).

Importance of ICT in Creating and Supporting an Effective Educational System

The importance of ICT is directly linked to the concept of ICT. Ideally, ICT lives to make life more meaningful and more bearable. As humanity has developed over time, they have sought better ways to accomplish tasks and to achieve goals for societal survival. Convenience, efficiency and effectiveness have been achieved through continuous computerization. Computerized systems have been developed to create fast and safe transportation, to support accurate medical surgery, to enhance precision in agriculture, to facilitate distance studying, to promote student-teacher collaborations, to deter crime, to facilitate entertainment, etc. ICT has also helped humanity to manage the modern life better. As resources dwindle and threats to human survival increase, humanity has sought more effective ways to adapt. For example, increased temperatures are calmed by the use of automated air conditioners and irrigation systems. ICT is a major response by man to the survival threats that exist (Ugandan Communications Commission, 2014; Williams, 2015).

Quite importantly, ICT has supported humanity to meet the need to communicate faster and clearly over long distances and in real time. As the world increasingly became a single global village, the need to quickly connect with global citizens in distant lands reached survival proportions. ICT was developed and leveraged to meet this need. For instance, the portable/wireless cell phones that have dozens of functions to facilitate all manner of communication were adopted to replace the analogue and immobile telephone. Social media platforms like WhatsApp, Facebook, Instagram, Skype and others allow citizens across the world to communicate and share information in unprecedented ways. This ease

of communication has led to reduced cultural prejudices, created job opportunities and exposed bad governance among other good things (Murungi, 2018; Williams, 2015).

As the needs of humanity evolve, ICT responds to catch up. However, ICT is also pre-emptive. Here, humanity has developed to appreciate that prevention is better than cure. In the past, weather changes confronted man in the most abrupt ways. However today, highly effective ICT warning facilities that caution nations and individuals of likely earthquakes, tsunamis, storms, drought have been developed. Google Weather guides and other similar applications and software give hour-by-hour, day-by-day predictions of the weather. The importance of ICT is huge. One wonders how life was possible in the days when ICT was not as developed as it is today. That's the premise for emphasizing the value of ICT in enhancing effective school administrative and instructional delivery systems in Uganda for secondary schools education. Effective instructional delivery systems translate to meaningful learning. This ensures that the student who completes secondary school education is a fully trained individual possessing the ability to interact with ICT tools by creating new content and has well developed social skills to facilitate further learning and innovation (Asuman, Khan & Clement, 2018; Belshaw, 2011).

Effective education is constructivist in nature. It recognizes the need to get the student involved in all aspects of the learning process. It is also inclusive and employs different approaches to allow for the student to learn with their unique styles and abilities (Omwenga, 2018; Singh, 2003). In view of the foregoing, the reasons why ICT is vital in enhancing effective school administration and instructional delivery systems in Ugandan secondary schools are discussed as follows:

First, the integration of ICT in secondary school education perfectly prepares the student for further studies and for tomorrow's job market. The world is moving very fast toward the comprehensive use of ICT. Coulby (2000) emphasizes that in today's global economy, knowledge is the most craved for product and service. Thousands of ICT applications and software are developed every passing month. For a secondary school leaver in Uganda to be able to excel in university studies, possession of adequate ICT competencies is a necessity. Much of today's university studies and assignments are driven by the internet and by other smart technologies. When secondary schools in Uganda fail to prepare the students to effectively manipulate ICT, the students will find it very difficult to succeed through the rigors of contemporary university education. Much of the employment today requires the individual to have good awareness of how the computer works. In the last 25 years in Uganda, the country has moved from using typewriters to computers, from using landline phones to mobile smart phones, from using hoes and oxen to using automated and computerized agricultural farm tools, etc. Many individuals who graduate today find a world where the acquired skills cannot meet the market demands. Therefore, unless the country modifies its education to be able to meet the needs of the 21st Century market, it will remain ineffective (Masele & Kagoya, 2018; National Information Technology Authority, 2018; Ugandan Communications Commission, 2014).

Secondly, ICT facilitates inter-school and inter-student collaboration across distances and time. ICT makes education effective because it allows the learners to readily connect with other learners in the country and around the world. Through the use of virtual learning environments, students can exchange insights and support each other to solve learning challenges. If ICT is comprehensively adopted to enhance teaching and learning in secondary schools, more students will be given platforms to express themselves academically and to interact with other students across the country via the internet. With proper guidance, the students can be able to interact with other students beyond the national boundaries. By this, the student will develop personal initiative and drive to enrich learning experiences. The students

will no longer wait for the teacher to give answers, but will develop own critical thinking skills to solve problems, thus enhancing scholarly effectiveness at secondary school level (Omwenga, 2018; Puentedura, 2010).

Likewise, ICT environments in secondary schools facilitate a global exposure for the learner. ICT via the web/internet creates an enriching global connectivity for the students (Williams, 2015). The world is narrowing by the day; creating a single global village. Yet many Ugandan secondary schools continue to be disconnected from the rest of the world because of the ICT disconnection, thus widening the digital literacy gap. The move to the utilization of ICT in secondary schools will enable the learners to appreciate cultural and other diversities of global citizens. This reduces prejudice. When a student in Uganda, via the internet, interacts with students from other parts of the world including Asia, America or Europe, they will 'see' the humanness in everyone. The students will be able to realize that humanity shares 'similar' challenges. This will embolden the Ugandan students to be more acceptable of others differences and to understand that they can compete with other global citizens as equal partners. They, consequently, will passionately contribute to global growth. This is another illustration of how ICT can transform secondary school education in Uganda for the better (Murungi, 2018; National Information Technology Authority, 2018).

ICT also facilitates inclusive education and gives a variety of learning opportunities to all students. When the country uses ICT to support instructional delivery system in secondary schools, many students will have opportunities to approach learning with the preferred learning styles. Students are gifted differently and have different motivations for learning. Some students learn relatively slow compared to other students. ICT makes it possible for blended learning (Singh, 2003) or for a flipped classroom experiences (Herreid and Schiller, 2013). Individual students set own pace. They can take work home and practice more on their own until they have mastered the concepts. They can also access instruction through several medium which include but not limited to videos, games, graphs, animations, simulations, etc. Here, learning is not just a one-time event, but a continuous process. Learning also becomes more fun and interesting for the students. Because of the collaborative-oriented learning via ICT, the stronger students are always able to help the not-so-strong students. In Uganda, many students in secondary schools are left behind in regard to scheduled syllabus and never get the opportunity to grow at their own pace. And this will change with ICT-driven learning in secondary schools (Ugandan Communications Commission, 2014).

Still, ICT helps to facilitate the professional administration of schools through proper records keeping among other things (Leask, 2013). Many secondary schools in Uganda have poor record keeping. Much of the information kept in Ugandan schools is still recorded on paper. There have been instances where schools have had disasters like fire and burglary which led to loss of vital records. This would be different in a situation where such records were kept on virtual storage systems like iCloud, Dropbox, or Google Drive. More still, ICT can help the school administrators to scientifically monitor learning and other growth patterns for individual students and the entire school. Teachers can also use ICT to keep track of own performances in day-to-day activities. Spreadsheets and other tools will clearly indicate the extent to which a teacher has been able to effectively facilitate learning in students. This gives room to necessary adjustments pedagogically in order to be more effective.

Additionally, ICT stimulates curiosity and innovation in students. ICT by nature is about innovation and making life more convenient. ICT is normally exciting to the mind and triggers curiosity

in the learner. British Educational and Communication Technology Association (Becta, 2001) asserts that when learners use technology to accomplish academic tasks, they also simultaneously keep asking of better innovative ways to accomplish the tasks. For example, traditional calculators have been evolving from merely multiplying, adding, subtracting or dividing to executing more complicated mathematical tasks. The users' love for convenience and effectiveness prompted this continuous change in the gadget. As learners give feedback to the manufacturers of ICT gadgets and tools, new innovations are made. Eventually, as highlighted in the Substitution, Augmentation, Modification, Redefinition (SAMR) model, the learners themselves start to get involved in the actual innovation to stimulate more growth (Puentedura, 2010). This is the kind of innovation that will be triggered among the students in Ugandan secondary schools when they are taught in an environment enhanced with information and communication technology gadgets.

Similarly, ICT-driven learning leverages the entertainment bit to help students develop extra interest in learning and gave birth to the concept "Edutainment". Traditional secondary school learning in Uganda can prove boring for some individuals. The lectures from the teachers, the many hand-written or typed notes and the never-ending homework assignments tend to be boring, and therefore negatively impact on performance. ICT learning takes advantage of music, video and other art to create 'flow' or heightened engagement (Nakamura & Csikszentmihalyi, 2002); while also helping the student to acquire critical information in the process. Here, learning is indeed fun. When the students enjoy the study experiences, this enthusiasm is likely to translate to improved performance on assignments; enhancing the learning environment.

Because of the heightened interest to learn, ICT makes it easier for teachers to instruct students. Many teachers in Uganda struggle through the teaching experience. They take on too much responsibility and eventually feel overwhelmed and exhausted. For example, a traditional teacher will draw lesson plans, plan individual lessons, teach the lessons to a class of not less than 60 students on average, prepare daily homework, prepare and grade quizzes, offer summative assessments and then grade them. On top of this, they listen to individual learners' academic and discipline challenges and give the necessary advice. This is overwhelming and only super-humans may excel here. This kind of lifestyle compromises pedagogy and affects overall effectiveness. With ICT however, the student takes on much of the burden from the teacher (Britland, 2013). The student, for example, supervises own work and receives timely feedback from other students in the work group or in the virtual learning environment. The teacher only does the oversight and guidance to ensure that the student keeps focused. By employing ICT in Uganda secondary schools, teachers will have ample time to concentrate on the more strategic aspects of the student's success like increased innovation and discovery – hence growing the entire effectiveness of the instructional delivery system to qualitative learning experiences.

Role of Stakeholders in ICT Integration for Effective Secondary School Administration and Instructional Delivery System in Uganda

Provision of Requisite ICT Policies and Infrastructure by Government for Digital Use:

Although in 2014, Uganda was one of the few countries in Africa to have ICT as a compulsory subject in secondary schools (Uganda Communications Commission, 2014), the country still lacked a comprehensive "ICT-in-education or schools policy guideline" by 2016 (Kisakye, 2015). National governments are responsible for creating 'the environment' for all progress and development. The policies of the state either work to promote the use of ICT or its abandonment. Government should make

it legally mandatory for every child in Uganda to be instructed with ICT technology and should diligently enforce this move. When the government is ambitious to get its citizens to be ICT literate it will create a comparative advantage for the country and will register faster economic prosperity (Papert, 1997). However, the situation for Uganda is still dismal.

A National Information Technology Authority NITA (2018) report revealed that “within [ministries, departments and agencies], ICT personnel account for only 1.9% of the total work force”. It will be wise, therefore, for the Ugandan government to support the development and use of ICT in schools - especially secondary schools in order to grow more ICT competent Ugandans. Still, good wisdom is that investing in young people will guarantee the sustainable use of ICT. This will stimulate an ICT revolution. Older people tend to be less enthusiastic about the use of ICT. And investing in them may be a waste of resources. Younger people on the other hand are still hungry for new innovations. Giving them ICT disciplines and competences is giving them what they naturally thrive in. The government of Uganda through its ministry of ICT has made some steps in this regard (Malaba, 2012).

The current poor ICT infrastructure and unreliable power supply and internet connectivity in the country will make the move to effective teaching and learning in secondary schools only but a mere dream. As a priority, government should ensure that all schools have access to reliable electricity. It should as quickly as possible set up fast internet connectivity in all schools in the country. It should also set up additional computer laboratories for common use at all schools. The ministry should also give laptop computers with good processor speeds to every school going child. Classrooms should be fitted with interactive smart whiteboards to expand options for effective instruction in class. While government may not have all the funds to comprehensive establish ICT systems in all schools throughout the country, it could start slowly – with well planned investment phases. Government, for example, could start by providing internet infrastructure and electricity before other things. It could then establish model schools with additional ICT expressions for teaching and learning. Using public-private partnerships, the government could work out schemes for supplying laptops at relatively low costs. South Africa, Rwanda and Kenya have taken such steps with fair results (Kisakye, 2015). This move to an ICT driven secondary school system is not a low-budget one, but is necessary to achieve sustainable effectiveness in teaching and learning in secondary schools.

Implementation of ICT Policies and ICT Infrastructure Utilization by School Administrators:

Head teachers and school administrators should be devoted advocates for ICT implementation at the school. These set the ICT tone for the rest of the school by supervising the installation of the necessary infrastructure. The head teachers are slowly mobilizing themselves for growth. For example, at a National Secondary School Head Teachers ICT Conference, the school administrators were trained to “improve ICT skills and attitudes required of head teachers to effectively integrate ICT in education management [for effectiveness in] secondary school education in Uganda” (Omwenga, 2018). Head teachers are highly regarded in Uganda. Therefore, through their motivational leadership, they inspire the rest of the staff to see the big picture for the migration to ICT in the teaching and learning at the schools. Still, the administrators give a contextual application of the national intentions. As it is, different schools have different physical, cultural, and pedagogical challenges. The local administrators and headteachers therefore help to customize the national ICT standards to best support the local school students. The administrators and the headteachers also support the good maintenance of systems. However, some school administrators may hold negative attitudes about the integration of ICT in secondary schools to achieve effectiveness. They may prefer to keep the traditional learning environment.

The administrators may see the move as a wastage of vital resources. This is a huge challenge to overcome – and may cause big delays in the transition to ICT-driven teaching and learning. To help these head teachers to transform their attitudes, government should give them tangible evidence of how ICT improves teaching and learning in fundamental ways. Government should set up model schools- driven by ICT – and show, comprehensively, how the literacy, comprehension, analytical and innovation levels of learners have improved as a result of ICT-driven education. Other benefits of using technology in teaching and learning are highlighted by Leask (2013) and include the ability to store and handle large amounts of information in different ways, quickly and easily perform tasks which might otherwise be tedious or time consuming and the possibility of using simulations to experience things that might be too difficult or dangerous to attempt in real life (p. 131). By getting the head teachers to be sold on, a clear path to achieving effectiveness in teaching and learning in secondary schools using ICT will be paved.

Adoption of ICT Gadgets by Classroom Teachers for Instructional Delivery:

The teachers help to give vital feedback on the effectiveness of the various ICT tools. Alemu (2015) speaks of the role of the teacher to enhance inclusiveness and to help with identifying what works well and what does not work (p. 173). The challenge though is that most teachers in Uganda lack ICT competence (Malaba, 2012). Leask (2013) suggests that for any successful ICT migration program, the teacher must of necessity have ICT competence in a multiplicity of ways. In addition to having competence to use the tools, the teacher should also be enthusiastic to engage with the tools. Digital immigrant teachers and those teachers in the country who think that ICT integration in schools is distractive to the teaching and learning of the child will frustrate the digital migration. Time and resources should therefore be invested in educating the teachers to be competent in using the ICT tools, but also to have an accepting attitude to ICT. The teachers should be shown how to interact with the child in the digital environments. The teacher should be helped to appreciate that with digital pedagogical practices, many aspects of the traditional lecture-and-teacher-knows-it-all aspects cannot suffice when helping the student to learn (Kovalchick & Dawson, 2004). ICT instruction requires a differentiated teaching approach that considers the uniqueness of the child and the learning needs of the child. Here, students may tend to work more independently and ask many questions for guidance in the process. When the teachers are aptly equipped with ICT technical and pedagogical competences, they will easily support the student to thrive at school - thereby enhancing the effectiveness of teaching and learning in schools.

Provision of ICT Tools for Low-Income Homes in Uganda:

ICT learning requires that it is not classroom bound. The students thrive better when they keep practicing lessons even at home. The parents' role is to buy smart phones, tablets or laptop computers and provide the necessary software. Parents also hold a special place of authority and influence over their children. They are therefore best placed to fan the ICT flame in the students of their household. The parents are also very helpful in the schedules of their children while at home. When the parents are fully engaged with the student's ICT-driven learning, they will always ensure that this is part of the family program. However, since many parents in Uganda may be indifferent regarding modern technology and its value to teaching and learning, the schools should hold sensitization seminars to win them over.

They can sustain or break the ICT migration chain depending on how they perceive its value to learning for their children. +More critical though for Uganda's parents, is that many don't have the kind of financial incomes that can, at home, complement the school's ICT program with ICT implements like laptop computers, smart phones or even internet. This breaks the ICT spirit of learning 'everywhere' one goes. At this point, schools, while working with government, should give additional ICT tools to the

students to use at home. This should be part of the overall ICT-in-schools implementation budget. When the parents facilitate continuous study with ICT at home – the students become more effective in their learning. This makes the school ICT education system more effective.

Promotion of Active Learning Experiences through ICT-Driven Approach:

The child, with guidance from teachers learns within his or her own style and rate of intake (DfE, 2011). However, for this ideal situation to take off, there is need for a complete cultural change in how children/students are regarded by the adults. In Uganda, cultural and traditions tend to relegate the child to the back row in many things. Parents and teachers tend to think that the child has to be told what to do all the time. The teachers tend to lecture at students and give little room for the child to express him/herself in the classroom. The child rarely thinks outside the box – for fear of disrupting the teacher’s rigid agenda. The learning environment is therefore strict and too serious - devoid of any innovation and fun. With the introduction of ICT however, the teaching and learning culture will be altered to the constructivist approach that is driven by and for the student. Papert (1997) speaks of how the teacher should commit to seeking new and exciting ways to present content and subject matter to the student (p. 2). He acknowledges that this is not necessarily easy, but it is possible.

The evaluation and assessments in the new ICT-driven education in secondary schools will have to depart from the traditional summative assessments to the formative nature of assessing the child’s progress. This though will not come easily. In Uganda the system is driven by preparing for high-stakes national exams that only focus on having the child to cram material. Students merely regurgitate what they have crammed and never develop habits of critical thinking and analysis of the concepts they receive in the classroom. Many schools may want to maintain this status quo because of the immediate pride and financial power it gives them when their students excel. ICT-driven education changes all this. The child learns and develops through the learning stages of Blooms digital taxonomy (Churches, 2009).

The child knows the material, then understands its concepts, then applies the knowledge, then analyses the concepts within the rest of the system, then evaluates the concepts with other systems, and can ultimately create his/her own new systems or products. This is the beauty of ICT-driven learning. It’s got the potential to transform the economies of nations. As students innovate and create new ideas, they contribute to national growth in science and research. Therefore, the move to ICT-driven secondary education is a move to the survival and advancement of the country. It’s a move to focus solely on the educational needs of the child (Anderson, 2004) that allows the student to think more critically and maximize their creative potential in the learning system. This requires the country to be courageous in investing its meager resources to this very vital area. Uganda’s education will be transformed for the best with the introduction of ICT-driven education at all levels and especially secondary schools.

Creation of Awareness and Advocacy on ICT Integration:

ICT has transformed the media in radical ways. Radio and television are now digital and social media has accorded each individual mass broadcasting rights – to unprecedented degrees. Knowing this, media practitioners should be at the forefront in helping the public to embrace ICT as the inevitable growth option for the future - including driving teaching and learning excellence in secondary schools. Other players like civil society organizations will also be helpful in lobbying the state and international agencies to intentionally create ICT environments in every school. They will support the ICT move in schools by looking for and finding the necessary funding to complement the government’s efforts.

Establishment of A Robust and Sustainable Financial Scheme for ICT Integration:

Since ICT changes at high speeds, the infrastructure that was suitable for instruction one year ago could be obsolete today. This poses a huge financial-investment challenge to a developing country like Uganda - to keep up to speed with the changes. It is therefore vital that government and other stake holders develop international partnerships to give funding buffers for the ever-changing ICT infrastructure. Without this, many local schools will be overwhelmed financially and will abandon the program. And this should never be. Therefore, for the ICT-driven education to be sustainable, the government through the ministry of finance and other responsible national agencies should move to create local funding capacities by securing reasonable annual budgets to keep the ICT in education migration continually thriving. When the move to ICT-driven teaching and learning in schools is supported by major stakeholders and institutions like the media, civil society organizations and others, there will be indelible positive effects on the effectiveness of learning and teaching in the country's secondary schools.

CONCLUSION AND RECOMMENDATIONS

In conclusion, it is evident that formidable challenges remain to frustrate the move to enhance teaching and learning in secondary schools in Uganda using ICT. These include the inadequate ICT-in-education policies, a big funding gap from the government and its partners, a lack of ICT competence among teachers, negative culture/attitudes toward integrating ICT in teaching and learning, poor infrastructure and unreliable power supply and internet connectivity in the country, and low-income homes that lack ICT tools to support the student's cycle of learning while at home. Still, while the journey toward attaining effective secondary school education will not be an easy one, it is achievable. The country has got a host of successful nations to benchmark with. In comprehensively integrating ICT in the secondary schools teaching and learning system, the country will not be reinventing the wheel. Many countries in Europe, America and Asia have working models that the country can contextualize to Uganda.

A key drive for the change to effectiveness in secondary schools is the realization that the survival of the country depends on this shift. It is also the realization that ICT aided education maximizes the potential of the child. And since education is about the child, this is a worthy shift. However, the stakeholders have to overcome the funding gaps. Government should allocate a sizable portion of the secondary education budget to the establishment of ICT infrastructure including computer labs, innovation rooms, interactive smart whiteboards, teacher ICT education, rural electrification, highspeed internet at schools among other things. Also, by making it legally mandatory for every child to be instructed with ICT technology, and by diligently enforcing this move, government will make it difficult for non-compliance. Still as discussed, we need to get the immigrant teachers in to the residence status as far as ICT is concerned. When teachers change their perspective toward the use of ICT in schools, 50 per cent of educational effectiveness will be achieved.

Further, as we need to regularly equip teachers with basic contemporary ICT competences, we will make it easy for them to support the students in the classroom or via the virtual learning environments. As discussed, the introduction of ICT in secondary schools is directly in the spirit of inclusive education. With ICT integration in secondary schools, the students not only enjoy the learning experience, but also find options for their appropriate learning styles. This too enhances the effectiveness of teaching and learning in secondary schools. Since, as discussed, ICT integration stimulates curiosity

and innovation, it should drive the stakeholders to fast forward its adaptation in secondary schools. This is because Africa, and Uganda in particular are in dire need of innovators – if the continent is to catch up with the ICT growth in the rest of the world. The integration of ICT in secondary schools in the country will help to uplift the livelihoods of the homesteads. When the government extends electricity to remote areas – so the learners in those regions have access to power supplies, the rest of the community – beginning with the households will benefit. ICT creates a beautiful cycle of growth. As the connected members of the community see the advancements in other parts of the world, they too will work to achieve the same.

Ultimately, the comprehensive use of ICT in schools will make it easy for the teacher to instruct the students. It's important to highlight though that all moves to the integration of ICT in the teaching and learning in secondary schools in Uganda, is to enhance effectiveness and should be done in close reference to “proven practices and models of teaching. With the technology at hand, the teacher will be able to expand options in passing on learning to the students. In the end, the comprehensive integration of ICT in Uganda's secondary schools will make the secondary school graduate to be fully equipped to face the market demands and any further learning and innovation that the 21st Century demands of each global citizen.

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DIGITAL LIBRARY ROLES IN EDUCATIONAL AND CULTURAL DEVELOPMENT: CHALLENGES AND THE WAY FORWARD

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ABSTRACT

Digital library is understood to be an electronic collection of real or virtual resources which are hitherto available elsewhere. They may appear in form of whole work which can be accessed holistically through cognitive or affective engagement. Digital libraries provide opportunities for widespread dissemination of information in a timely fashion. With this development, access to information in a networked world is now concerned of many people. If this is true, what then is the role of digital libraries especially as far as educational and cultural developments are concerned and what challenges are faced by digital libraries. These are the questions answered in this paper. Hence, the paper examined digital libraries and considers its roles in educational and cultural development, the services offered by digital libraries, the types of today's digital libraries, the challenges it's currently facing and the possible way forward.

Keywords: Digital library, Educational development, cultural development, Information access, information dissemination, digital scholarship, digital commons.

INTRODUCTION

Digital library is understood to be an electronic collection of real or virtual resources which are hitherto available elsewhere. They may appear in form of whole work which can be accessed holistically through cognitive or affective engagement. Through the digital library, online or offline access to the materials organised and housed including multimedia and multilingual data is allowed. Digital libraries provide opportunities for widespread dissemination of information in a timely fashion. There are numerous definitions of "digital library" but a consistent characteristic across all definitions according to Fox, Hussein, Madalli and Cassel (2003) "is an integration of technology and policy. This integration provides a framework for modern digital

library systems to manage and provide mechanisms for access to information resources. This involves a degree of complexity that is evident whether considering: the collection of materials presented through a digital library; the services needed to address requirements of the user community; or the underlying systems needed to store and access the materials, provide the services, and meet the needs of patrons”.

Access to information in a networked world is now concerned of many people. As Borgman (2000) emphasised, access to information is basic for constructing a global information infrastructure, the digital library. This author goes on to state that Information resources are essential for all manner human activities such as commerce, education, research, participatory democracy, government policy and even leisure activities. Access to information based on all these is at the centre of the discontinuity-continuity debates. It has been argued that computer networks, digital libraries, electronic publishing, and similar development will result in a radically different form of information access. The technologies that create, distribute and preserves will experience dramatic change, so also is information institutions including the libraries, archives, museums, schools and universities. Already, digital libraries are now the global information infrastructure that is making access to information easier. If this is true, what then is the role of digital libraries especially as far as educational and cultural developments are concerned and what challenges are faced by digital libraries. These are the questions answered in this paper. Hence, the paper examined digital libraries and considers its roles in educational and cultural development, the services offered by digital libraries, the types of today’s digital libraries, the challenges it’s currently faced and the possible way forward.

LITERATURE REVIEW

The digital library is dependent on the Internet and the intranet. The Internet ensures the connection of the digital library to other networks around the world. The intranet is an internal network serving the organisation or institution including educational institutions such as colleges, polytechnics and universities. The Internet and intranet use networks, computers software and hardware to function. Therefore, ‘digital libraries are characterised by globally distributed, interoperable, content rich systems’ (Griffin, 1998). It should be noted that libraries function as information centres, learning centres, training centres, and publication centres. This environment requires special services such as storage and organisation, search capabilities, retrieval, virtual references, security, digital scholarship, etc. Furthermore, a digital library may be construed as a managed collection of information linked with services where information is stored in electronic cum digital formats which are accessible over a network. It could be noted from this definition that the information managed. Therefore, a continuous flow of data sent from a satellite to the world is not a library.

The data in question, when organised systematically become a digital library collection. (Arms, 2000). In terms of features, digital libraries consist of numerous collections of information used by various users. Digital libraries vary in size from small to large. They can use any form of computing gadget and any suitable software. The underpinning theme is that information is arranged on computers and available over a network with procedures to select the materials in the collections, to arrange it, make it available to users, and to achieve it. Digital libraries are different from the traditional libraries, however, there are some similarities between them. Sifting from traditional libraries to digital libraries is not merely based on technological changes but the change in paradigm by which people access and interact with information. Going by the position of Reedy, Ager, Chellappa, Croft, Davis-Brown, Mendel, and Shamos

(1999), a traditional library is characterized by “its emphasis on storage and preservation of physical items, particularly books and periodicals, cataloguing at a high level rather the detail bibliometric information such as author and subject indexes as against to full texts, browsing based on physical proximity if related materials e.g., books on sociology are near one another on the shelves and passivity; information is arranged in one place; users must travel to the library to learn what is there and make use of it. In contrast, a digital library differs from all of these. It has emphasis on access to digitized materials wherever they are existing and can be located, with digitalization eliminating the need to own or share a physical items, cataloguing down to individual words, browsing based on hyperlinks, keywords, or any defined measure of relatedness; materials on the same subject do not need to be near one another in any physical sense., broadcast technology; user need not visit a digital except through remote access. As Reedy et al (1999) indicated, the library exists anywhere they can be accessed such as home, school, office, or in a car.

As emphasised by Arms (2000), “people do not change because new technology is invented. They invent information that has to be arranged, stored, and distributed. They still need to find information that others have created and use for study, reference, or entertainment. However, the form in which the information is expressed and the methods are used to manage it are greatly influenced by technology and this creates transformation. Every year, the quantity and variety of collections available in digital forms grow, while the supplementary technology continues to improve. Consequently, these changes are facilitating fundamental alterations on how people create information and how they use it’. In the following sections, the paper will be looking at global information infrastructure as digital libraries, the opportunities and potentials offered by digital libraries, the role of digital libraries in educational development, the challenges of digital libraries and the possible way forward.

Now that digital libraries are common place around the world, the essential question to ask is that; of what potentials are these libraries to the users and patrons at large? The next section below provides an answer to this question. Arms (2000) highlighted the potential benefits of digital libraries. These are bringing library to the user, the use of computer power for searching and browsing, opportunities for information sharing, easy way of keeping information current, readily available information, and possibility of new form of information. These are now discussed in detail as follows:

The opportunity of the digital library in bringing the library to the user: Digital libraries house different collections of information used by many various users. All people anywhere anytime can use any Internet-connected digital device to search all of human knowledge. Via the Internet, they can access knowledge in digital collections created by traditional libraries, museums, archives, universities, government agencies, specialized organizations, and even individuals around the world. Digital library now makes information accessible to the users either at work or in the home thereby making it easier to use. The availability of digital library on the desktop of users has reduced the necessity of visiting the library building. Wherever there is personal computer connected to the network, access becomes unlimited.

Using computer power for searching and browsing: It is easy to search and browse using the computer. Print documents are easy to read, but finding information stored on paper can be a daunting task. Instead of looking through all form of catalogue before locating information one is searching, computer is now making it easy to locate information within a twinkle of an eye. One thing that is noted about digital libraries is that there is availability of useful materials that

readers can discover by coincidence. Mostly, computer systems are better in finding information than manual method. However, they are not as easier as everybody like them to be, however, there is improvement in terms of becoming more user-friendly than before. Computers are useful for reference work that involves repeated leap from source of information to the other.

Sharing of information: Digital libraries now making sharing of information possible. Digital libraries provide opportunities for widespread dissemination of information in a timely fashion. Putting digital information on a network makes it feasible for everyone. Most digital libraries or electronic publications are managed at a single central site though with a few duplicate copies technically stored around the world. There is a considerable improvement over quality physical duplication of used materials or the difficulties of unique material that not accessible without travelling to the location where they are stored.

The easy way of keeping information current: On this point, Arms (2000) emphasised that important information needs to be made available continually. The author pointed out that materials are difficult to update because the entire documents must be reprinted; all copies of the dated version must be tracked and substituted. Making information current is less tedious when the original version is electronic format and stored on central computer. One of the advantages of the digital libraries is currency, i.e. the information is up to date. Currency is dependent on resources for maintenance. Apparently, it is important that dates of creation and revision are carried on digital library documents. However, users tend to regard digital information as being current, which poses an extra responsibility for the creators of digital libraries while users of print-based library are prepared to accept a 3-year-old reference work for what it is, and accept that it may not have information on recent changes in the field; in the digital environment a resource that had not been updated for 3 years would be dismissed as out of date. Most libraries make provision for online text of reference works such as directories, encyclopedias whenever revised editions are received from the publishers, they are installed on the library's computer. The new versions are available instantly. The Library of Congress has an online collection called Thomas that contains the latest drafts of legislation currently before the US Congress: This change continually.

Readily availability of information: Available information resources must be differentiated from the accessible ones. Availability of information sources means ensuring their presence in libraries for immediate use. In the case of traditional libraries, information materials may be available, meaning that the library has acquired them, but they may not be accessible to those who need them for whatever reason. The reverse is the case for digital libraries. Information in any format is readily available. The gate of the digital library is never closed but rather remain open 24/7. Arms (2000) in a report of a study at a British University, revealed that about half of the usage of a library's digital collection has been used when the library buildings were closed. However, it was emphasised that computer system are not perfect but can fail and network may be slow or unreliable. Compare to traditional library, information is much more likely to be available when and where the users want them.

Possibilities of New forms of information: Utilising new technology opens up new possibilities. Libraries can be not only more but also better than in the past. We see this first and foremost in the collections, in the services offered and in the collaboration with other sectors in the community. With new digital libraries technology, it is much easier to integrate different collections and to give the user access to new, virtual collections. The individual library's

service to the user is less dependent upon having everything in the stock itself since now the user can search through many libraries. These virtual collections will appear more complete to the user and the reform also seem better in quality. Digital libraries also create the conditions for user-directed services, specially designed for a particular type of user in a given context. It is easy to appreciate that a historian would require a different interface with a photographic collection on the Internet than would a school pupil. Arms (2000) explained that most of the information stored in conventional library is printed or paper, yet print is not always the best way to record and disseminate information. The author suggested that databases may be the best way to store census data for instance, so that it can be analysed by computer, satellite data can be rendered in many different ways. For instance, mathematics information can store mathematics expression, not as ink marks on paper but as computer symbols to be manipulated by program such as Mathematical or Maple.

The role of digital libraries in educational development

In this rapid changing world, digital libraries offer many facilities to education in general and to higher education in particular (Pavani, 2007). Of course, digital libraries are playing many roles in educational development and other aspects. However, the discussion in this section is only limited to the role played by digital libraries in educational development.

Slater (2005) identified the role of digital libraries in education to include the fact that it enables users to have better control over their electronic documents, a new first-tier knowledge resource for users with access to large digital libraries, opportunity of browsing more often than others, one environment for academic work and inspiration of project for publication, etc.

Jayaprakash and Venkatramana (2006) emphasised that part of the rationales for using digital libraries in e-learning is because it has the capacity to store and manage a large number of digital contents including full text, course materials, bibliographies, catalogues, images and audio clips. These make it provide an environment where collections are brought together, services and people in support of the full life cycle of creation, dissemination, and preservation of data, information and knowledge.

One other reason for using digital libraries is that it provides an opportunity for using various electronic tools available in which learners can search text materials and images easily and quickly. This is applying broadly across all kinds of institutions. Advance intercommunication technology, sophisticated search engines and affordable cost, huge storage facility of digital contents are the other reasons to implement and integrate a digital library in education. Other role digital libraries played in education as emphasised by (Jayaprakash and Venkatramana (2006) are opportunities for learners to use electronic resources from anywhere without even knowing where it is stored geographically. It should be noted that base on this, study materials can never go out of print, and new editions can easily be created and added. One can access several titles at once on a portable reader and, over time, build a personal library. It produces current information that assists in research work. In coping with the advancement in technology, and production of information, multidimensional forms make it become essential for users to pursue additional knowledge at all times in order to be up-to-date in their field of interest. The virtual conferences, collaborative work on projects shared among institutions, exchange of useful materials and experiences among teachers, provision of up to date information for researches are some of the factors directed towards learning.

Pavani (2007) identified the role of digital libraries in courseware. The author explained that reading materials including books and other items are kept and distributed by the university libraries. Therefore, class notes, simulations, spreadsheets, and other materials created by faculty are made available by their authors through copies distributed in an informal situation. The utilisation of information communication technology tools has transformed the informal distribution to computer and networked-based solutions. As a result, a large number of contents became available from computers lacking the necessary identification and access control. However, this identification is important for the search and retrieval actions by the users.

Pavani (2007) added that digital libraries are essential tools to manage courseware and additional reference items used in the classrooms. Reasons given include: management of documents in all formation and in a unified manner, access control, content sharing, interactivity, customisation and reuse, cross institutions cooperation, and students' opportunity to study anytime, anyplace, different hours of the day, any day of the week are all significant when distance learning is considered. As Pavani (2007) indicated, there have been some experiences in the use of digital libraries in the management of courseware. The results so far have been satisfactory in terms of access and sharing. According to Cardoso and Pavani (2000), the Maxwell System allows five access level and four sharing levels, and this has given the faculty reasonable flexibility in the use of contents thereby resulting in a fair quantity of reuse of basic contents.

Using digital libraries as sources of reference is also worth mentioning. Students visit the libraries to look for materials where they can get additional materials beyond the course contents. They look for additional books, journals theses and dissertations, technical reports and other items that facilitate their learning process. This becomes important especially at the undergraduate and graduate levels, Research involves lots of searching, retrieving and reading. Therefore, libraries must make available relevant collections to fulfil this purpose and need. Examples of traditional activities of the libraries include subscriptions to scientific journals and conference proceedings. Digital libraries just like their traditional libraries counterparts can hold reference materials in the context of software and made them available 24/7.

In terms of scholarly publication, universities have played their role. The availability of personal computers connected to the Internet has allowed researchers to report results through these systems in addition to the traditional printed journals. Van de Sompel and Lagoze (2000), Lagoze and Van de Sampel (2001) indicated that the fast pace of research results in the sciences have required alternative forms of publication to conquer the latency times of traditional peer-reviewed journals. In the same vein, the increasing costs of journals subscription have also required the need for alternative ways of publishing.

The role digital libraries played in creating Open Access cannot also be overlooked. Pavani (2007) maintained that 'the world over, intellectual property right (IPR) are protected by law. This is essential in view of the fact that IPR is a basic right of democracy and stimulus for intellectual creation. At the same time, authors may intend to share their works, especially in academia. This is the rationale behind the Creative Commons, a non-governmental organization created in 2002. The goal of the organization is to help authors share their works under the idea of "some rights reserved" instead of "all right reserved". They neither suggest that authors' rights be violated or that copyright be abandoned; except that works be shared in the extent find suitable by the authors. On their websites, the motto is "share, reuse and remix

legally” This motto contains ideas that can easily be implemented if digital libraries are used to manage digital contents.

Now, worldwide efforts towards open access are ongoing. Notable events to facilitate this process include but not limited to: Budapest Open Access Initiative (Budapest Open Access, nd*). The second is the Berlin Declaration on Open Access to Knowledge in the Sciences and it was signed during the Conference on Open Access to Knowledge in the Sciences and Humanities in 2003. The third action is that of Humboldt University (2006) in Berlin. The senate in this university approved the Open Access Declaration that encouraging her scientists to publish in open access journals and make the publications available through technological infrastructure.

The role of Digital Libraries in Cultural Development

The fact that Digital libraries are playing significant roles in cultural development in our contemporary world cannot be overemphasised. The first important role played by digital libraries in cultural development is the preservation of cultural heritage. The purpose of preservation is to protect information of enduring value for access by the present and generation to come (Conway, 1994). Libraries and archives have served as the central institutional focus for preservation, and both types of institutions include preservation as one of their core functions. Many major libraries and archives have now established formal preservation programs for traditional materials in paper, microform, photographic and to lesser degree audiovisual formats” (Griffin, 1998). Through preservation and propagation of indigenous culture, the relevant information is readily available locally in contrast to the preceding scenarios, which disseminate within developing countries information originating in the developed world.

Supporting digitization, access and preservation of scientific and cultural heritage is also worth mentioning. Equity of access and preservation of the scientific and cultural heritage of mankind is everybody’s right and helps in facilitating learning and understanding the richness and diversity in the world, not for present generation alone but as well for the incoming generations. As a means of recording and providing access to our cultural memory, digital libraries have numerous advantages and may help relieve the traditional conflict between preservation and access. Users operate on materials digitally stored on the exact images of the original works stored in their local computers thereby separating usage from the original. This affords digital technology multiple, simultaneous uses from a single original in ways that are simply impossible for materials stored in different format. Digital technology also yields additional, effective means of access. In full-text documents, a reader can retrieve needed information by searching for words, combinations of words, phrases or ideas. Readers can also manipulate the display of digital materials by choosing whether to view digital materials on a screen, store them on their computer or external media, or to print them.

Digital libraries make accessibility to cultural information possible to all those who wish to make use of them. Through Digital libraries, artefacts of culture are being put in a central, accessible, nonprofit place. Digital libraries have the facilities to send out photocopies, users also have opportunities of exploring digitization options so that scholars who cannot physically get there can still have access to materials. Digital libraries open up a broad knowledge and information connecting to cultures across geographical and social territories. The transformation of libraries as builders and hosts of digital libraries facilitates the spreading of

skills in information and communications technology. This underpins the literacy, personal development and scientific knowledge required for social and economic change.

Digital Libraries Services

As stated earlier, the digital library environment requires special services such as storage and organisation, search capabilities, retrieval, virtual references, security, digital scholarship, etc. These services are examined in turn as follows:

Storage and Organization: Physical libraries are well known for storing information and organizing information. Digital libraries have so far exceeded the capacity of storage in a physical library, by offering space-saving techniques for storing and displaying data electronically in the form of; Library catalogues; Text-based e-resources, e.g. Databases, books and periodicals; Digitized rare and special collections; Multimedia collections, e.g. video, sound, film, graphics, pictures, maps etc. Services for acquiring and organizing library information resources are also inclusive.

Search and Browsing Capabilities: A very good outstanding technique about digital libraries is the capability to search it without any physical or time constraints. Examples are; Library catalogue search, i.e. OPAC; Searching for rare and preserved sources; Searching for national repositories (e.g. national archives) through an online portal and cross-domain searching; Searching for a variety of e-resources within one portal; Browsing the entire range of resources in the DL.

Retrieval: Retrieval depends on the manipulation service availed by the DL. It is heavily influenced by Interface and interaction with the system, e.g. how search results are displayed and what graphic user interfaces are used to deliver quality web-based library user services. Architecture, navigation, and overall design concerned how users can search and navigate around the DL.

Virtual References: This involves the use of instant messaging service including using electronic Inter-Library Loans System; access to all electronic resources for all, e-reserves for all popular teaching materials. Self-Issue and Return facilities to enable users to issue renew and return books and journals without the need to queue at a busy Service Desk. Online Reference Services; e.g. ask a librarian, Instant messaging (IM) A federated one-stop search engine for all library catalogues and databases (including the IRs).

Security: This is yet another important service in a digital environment. The users of a DL enter their personal details, these need to be secure. The DL carries copyrighted materials, there needs to be secure from manipulation by the wrong people. The nature of digital material makes it vulnerable to hackers and virus attacks, this call for security. The DL, at its inception, must have a policy on security and publishing.

Digital Scholarship Services: Digital scholarship has been associated with academic libraries. The term has been commonly used for the application of modern technology to carry out teaching, learning and research activities These are services that support users' digital scholarship from the inception of a task until the completion. At task inception, the user searches for relevant information using all the services mentioned so far (interface, navigation, searching, manipulation etc.). After successfully getting the information, to complete the task, the user might want to: Annotate the sources used, summarize sources consulted, create new

information by combining text and multimedia sources across all available information. The digital scholarship encourages the manipulation and use of information in a nontraditional way.

Digital Libraries of Today

The digital libraries of today vary in types and design. These include the under-listed.

1. The digital library of today includes the one tagged Patron-augmented digital libraries (PADLs): a type of digital libraries designed to support digital scholarship. Examples services rendered by digital libraries are facilities for search and retrieval, augmenting the library's collection with annotations, and original compositions and access to digitized multimedia and associated textual transcripts.

2. Knowledge Commons: Knowledge Commons is another type of DL characterized by:

- a) Storage of a large variety of information object types
- b) Information objects composed of several multi-type and multimedia components aggregated in an unlimited number of formats.

Knowledge Commons is offering services such as general utilities, (annotations, summaries, etc.) and audience specific functions like map processing, analysis of images etc. (Castelli, 2006). Examples of software that enhance digital libraries are Synchrony for synchronized mixed text and video presentations and publications (Goh,2001). DSpace Digital Repository: an open-source software platform that enables institutions to capture and describe digital works (e.g. www.dspace.org) and the Digital Library Infrastructure on Grid Enabled Technology (DILIGENT) (Castelli, 2006).

Challenges of digital libraries and way forward

As pointed out by (Pavani, 2007) digital libraries do encounter many challenges. These according to him include interoperability, 24/7 operation, multi-language, and multi-culture issues and multi-legislation situation, multiple information types and ever-changing digital formats, information asset security, digital preservation; and intellectual property rights (IPRs).

Preservation challenge – In terms of meaning, libraries collect information on both the current and future needs of the users. Howbeit, there are some systemic efforts put in place to ensure continuous access to digital collections on the Internet. Most of the information on the internet are ephemerals and presents considerable challenges for archiving. It is important that preservation ensure resources are intact because unauthorised tampering with the content of electronic resources could have grave implications for its continued value. Technological security will aid the preservation in terms of preventing corruption or destruction of information resources and ensuring their authenticity.

There are special cases of preservation challenges. These are related to born-digital contents. These are contents that have not existed on other media. Perfect examples are the case of computer-based simulators, online interactive exercise and animations which are important learning objects. Other sets of born-digital contents are present in online interaction in companies or between companies and business partners or clients (e-business and e-commerce) and in government actions (e-government). These are areas where archives and archivists are very active as a result of the mission to preserve institutional and government archival documents. The problems are encountered as higher education migrates from traditional media

to the digital formats. For instance, when theses and dissertations written on papers are no longer used and ETDS became the only available format, archival problems are experienced particularly when it comes to long term preservation of this information or documents.

Preservation of born-digital objects has become an issue of concern particularly as a result product that is no longer exists. Preservation of access is another great challenge. In 2003, a news release by Ascribe in an article written by Dellavalle, Hester, Heilig, Drake, Kuntzman, Graber and Schilling, (nd*), showed that the results authors obtained after searching internet-based reference on medical publications is quite surprising. The internet references accounted for 2.6% of all references on more than 1,000 articles published on three medical journals from 2000 to 2003 - New Journal of Medicine. The journal of the American Medical Association and science. In addition, 13% of the internet references were list for articles that 27 months old or lesser.

With the above, Pavani (2007) raised a question that if digital technology is splendid, what is stopping libraries from becoming entirely digital immediately? Answering the question, Pavani noted that digital libraries technology is still immature, but the challenge is heavier than technology. An equal challenge is the ability of individuals and organisations to version a means of using technology effectively to absorb the inevitable changes and to create the required social frameworks. Pavani further explained that the new world of information is like a large machine with many participants each contributing their experience, expertise and resources. Making fundamental changes in the system needs interrelated shifts in the economic, social and legal relations among the stakeholders.

Digital libraries depend on people and cannot be introduced faster than what people and organisations can adapt and cope with. The creators, users and the professionals who support them have to be considered. The link between these groups is changing. With digital libraries, readers are more likely to go directly to information without visiting a library building or having any contact with a professional intermediary. Authors carry out more of the preparation of manuscript. Professionals need as well need new skills and training to support new relationships. Some of the skills are absorbed acquired through experience, while others can be taught. Since librarians have a career path centred on schools or librarianship, the schools are adopting these into their curriculum, but it will take many years before the changes materialise. Other challenges of digital library worth mentioning are the following:

Challenge of Economic Infrastructure – Lippincott (1997) emphasised that numerous internet site are opened free of charge. An increasing number of sites are restricting access to subscribers or fee payers while some digital library projects that have been developed in academic institutions are now searching for continued funding and are considering licensing arrangements or user fees. The challenge of economic infrastructure now makes many digital libraries to introduce new and uncertain economic realities and relationship into libraries where the costs of accessing information are once hidden to patron; compared to the digital era which requires customer who will pay fees for access to digital services and collection. However, the question is, how many users can afford to pay the services offered by the libraries? Will the technology provide access to digital information massively and not end up restricting it only to the very few who can pay the fees?

Moreover, it understood that the global economic recession is having implications on digital libraries in terms of digital collection development where huge amount costs for

implementation, licensing, training, promotion, and the development and support of technical infrastructure are required. Lastly, economic modalities for making the digital library work in terms of real costs and benefits, have neither been clearly established.

Searchability challenge - It is not an easy task finding and using materials on the Internet. Digital documents can exist in different formats, precisely in numerous versions, in an unfixed location. For example, a document or resource may exist in one network location today and may not be there again tomorrow. Search engine services such as Alta Vista, YAHOO, GOOGLE and other WWW services are rapidly gaining pace. Lippincott (1997) explains that developing more sophisticated search engine is a method; another is developing filtering devices based on individual profiles and knowbots that search the internet on the users' behalf. Lippincott added that researcher and experts are looking for information that requires to be integrated or added to network information in order for the search systems to be very effective. In light of this, it is recommended that material or document or website should have information pertaining to itself and should be built in a standardised format (metadata) that will enable the search engines to retrieve information effectively.

Service challenge –There is no doubt about the fact internet user's operation in a self-service model, but not out of choice as observed by Lippincott (1997). The author pointed out that limited digital libraries have built services into their stocks or collections. What some users need is just assistance on how to interpret and manipulate the information or assistance on the best way use available Internet search engines. The way out of this challenge is for the digital libraries to have built-in services where it will be possible for users to ask questions and where guidelines can be provided. This can be in form of frequently asked questions (FAQ).

CONCLUSION

This paper has so far examined the digital libraries in terms of its role in educational and cultural development, the services it offers, its types in today's world, its software and the challenges it's currently faced. This is considered a contribution to the review of literature in this area as the extant literature has shown that there are few papers and research that consider the issue. Moreover, while researches have considered the role played by digital libraries in higher education institutions, there is little effort in the area of the contribution of digital libraries to educational and cultural development. In addition to this, researchers have identified various challenges facing digital libraries but little efforts have been made so far to deal with these challenges. These are a vital research area for future direction. In light of this, the paper concluded that digital libraries have contributed lots to the educational and cultural development globally. However, the fact remains that the challenges facing it need to be eradicated so that further opportunities are provided for more global access to information by the users.

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THE ROLE OF TECHNOLOGY IN THE PRESERVATION OF RECORDS IN THE DIGITAL AGE

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ABSTRACT

The explosion of Information Communication Technology has expanded the scope of information and records creation and the tools of information delivery. The integration and adoption of Information and Communication Technology particularly in the preservation of records at this digital age is now becoming common place. No doubt, preservation of records is necessary as records are memories of the internal and external transaction of an organization. Preservation of record enhances easy access to record when needed for referencing or in an attempt to retrieve information from them. Preservation practice for long time now has been linked with information technology in the areas of production, organization, storage, dissemination, and retrieval of records, using the available technology. On this note, this paper examined the role of technology in the preservation of records in the digital age. It discusses other issues such as global initiatives on the preservation of records, methods of digital preservation of records and constraints to the preservation of records.

Keywords: ICT, Records creation and proliferation, Records preservation and conservation, Digital age,

INTRODUCTION

The revolution which occurred consequent on the development in the use of Information and Communication Technologies has resulted in the availability of such information in documents and records formats. The integration and adoption of Information and Communication Technology particularly in the preservation of records at this digital age is now becoming

common place. This is because many records are now being born digitally. On this note, Anamuah-Mensah and Asabere-Ameyaw (2009) and Osakwe (2012) also observed that record keeping was also enhanced through the use of ICT, hence enhancing productivity and cost-effectiveness.

ICTs are computer-based tools used to meet with the Information and Communication needs of individuals and organizations (Haliso, 2011). They comprise computer hardware and software, network and several other devices (video, audio, photography, camera, etc) that convert information, images, sound, and motion, among others into common digital form (Osakwe, 2012). ICT involves the use networks, hardware and software and media for the transmission and presentation, collection, storage of information (voice, data, text, images) and related services (World Bank, 2007). It is a broad term that has to do with the harnessing of process, the methods and the product of electronic communication related technologies. Other related resources in today's knowledge-driven society, for enhancing productivity, the spread and efficiency of set programme activities are geared towards the achievement of clearly defined goals (Obanya, 2002).

ICT is an eclectic application of computing, communication, telecommunication and satellite technology (Yusuf, 2005). Therefore, ICT can be defined as an electronic device for managing and processing information with the use of soft and hard wares to convert, store, manipulate, protect, transmit, manage, control and retrieve information for the enhancement and productivity of personal and organizational activities. Information Technology coupled with transformation in organizational structures and methods of working have resulted in an increasing amount of information and also to totally new forms of information and in the creation of the record. The records so created and available in large quantities need to be preserved for future purposes. As indicated by Santos (2016), preservation is the set of activities that aims to prolong the life of a record and relevant metadata to improve its value or facilitate access to it via non-interventive means.

As Asunmo and Yahaya (2016) emphasized, the art of preservation is as old as human civilization itself and it may be said to derive from the instinct of self-preservation common to all animate beings. Preservation can be seen as a branch of Library and Information Science that concerned with maintaining or restoring access to artefacts, documents and records through the study, diagnosis, treatment and prevention of decay and damage. No doubt, preservation of records is necessary as records are memory of the internal and external transaction of an organization. Preservation enhances easy access to records when needed for referencing or in an attempt to retrieve information.

No doubt, the advent of information communication ICT has enlarged the scope of records creation and the tools of information delivery (Ridwan, 2015). Preservation practice has long time been integrated with information technology in the areas of production, organization, storage, dissemination, and retrieval of records using available technology (Abdulrahman, 2015). This paper focused its discussion on the role of technology in the preservation of records in the digital age. It discusses other issues such as global initiatives on the preservation of records, methods of digital preservation of records and constraints to preservation of records.

LITERATURE REVIEW

In this current information society, there are important functions in the society such as the issuance of national identity, national registration. All of which have to be accessible for long periods. In the absence of authentic, accessible, searchable, and reliable records, these functions are practically impossible to maintain (Asproth, 2007). The implication of technical developments and the transition to electronic media is that traditional methods have dated or least inadequate. Access to the relevant information is essential in a democratic era. The increasing rate of public electronic services implies that there will be an improvement in the amount of document and information coming in to or being created by the authorities, which will be in electronic form. This information must be managed and stored by the authorities and at a later stage be sorted out or transferred to long-term archives. Viewed this in terms of longevity, it is also essential that these electronic records are preserved as a cultural heritage and collective memory of human engagement.

Preservation of Records

The term preservation refers to the passive protection of archival materials in which no physical or chemical treatment to the item occurs (Vasanta, 2015). Viewed from the archival perspective, preservation is the totality of processes and operation involved in the protection of records and archives against damaged or deterioration (Mutero, 2015). Four related activities are involved in preservation. These are maintenance, examination, conservation and restoration.

Maintenance: This activity involves the daily care of records and archives, essentially in the current and semi-current records environment, when they are kept in offices or records centres (Kootshabe & Mnjama, 2014).

Examination: This involves the preliminary process of taken to determine the original materials and structure of an item and to determine the extent of its deterioration, alteration or loss (American Institute for Conservation of Historic and Art and Artistic Works of Arts AIC and ICOM- CC, 2018).

Conservation: This activity involves the intrusive protection of archival material by the minimal physical and chemical treatments necessary to resist further destruction which will not negatively affect the integrity of the original (Mutero, 2011).

Restoration: This activity has to do with the repair of the document when aesthetics and reproduction of the original appearance are more vital than the preservation of the integrity of the item (Vasanta, 2015). However, is not viewed as an archival activity.

Records whether or not they are properly maintained, examined, conserved and restored, there are associated issues, particularly in this digital age. These are discussed in the next section.

Issues with Preservation of Records at the Digital Age

As stated by (Kumar, 2012), if we assume that libraries are able to build and/or acquire some types of digital collections, there remains a significant challenge inherent in preserving these collections. Pre-digital libraries have had to worry about climate control which is time

consuming and the de-acidification of books which is costly, but the preservation of digital information proffer solution to these two problems. For example, digital storage is delicate with a limited shelf life. However, the digital information on those storage media, even if they do survive will be rendered unreadable by the fact that as information technology evolve, older systems erode or fade away taking with them obsolescence of technology the ability to read the information they managed. To preserve digital information, digital libraries will continually have to “migrate” information from one digital hardware and software configuration to another. The Report of the Task Force on Archiving of Digital Information suggests that "rapid changes in the means of recording information, in the formats for storage, and in the technologies for use threaten to render the life of information in the digital age as, to borrow a phrase from The Digital Library: Myths and Challenges (Asproth, 2007).

At the digital age, there are many challenges associated with the preservation of electronic information that needs to be solved. Organisational, legal and technical are issues of concern (Asproth, 2007).

Technical issues

Issues at stake in this domain are of various entities. The huge amount of electronic record requires storage for active use and in turn demands new mass storage media (Asproth, 2005). Fragility is another problem of the media which lead to low durability. There is also lack of knowledge pertaining to durability of different media for storage. Furthermore, poor security exists for many electronic files. The software problem concerns the rapid development of new versions of the software product and occasionally change over to new software products. Additionally, the software is not always accurate for the purpose (Kumar, 2012).

Legal issues

Several issues other than legal have an impact on digital preservation particularly access to archives. Data protection –Human Rights and Act- Freedom of Information – Defamation – Access for Disabilities. Digital preservation is often a grey area not understood or considered by legislators. Lack of legal certainty prevents digital preservation actions (JISC, 2004).

Organizational issues

Many of the challenges associated with digital preservation are organization and not technical. The argument against the loss of valuable information rests with the creators, providers, and owners of digital information (Kumar, 2012).

Context and Metadata

A number of questions surround the metadata issue. For instance, how is it going to be possible for anyone in the future to understand the context of the information and the procedures involved in creating it? There is another question considered to be of great importance, this is how can we determine the amount of evidential historicity required and how do we capture and retain it? The place the metadata should reside (in the digital information system, in paper form or both)? Notably, document consists of both medium and content. Paper is the medium

of the paper bound documents and with virtual documents, it is now the metadata which forms the real medium (Asproth, 2007).

Additionally, (Yaya, Asunmo, Abolarinwa, Onyenekwe, 2015; Asunmo and Yahaya, 2016) pointed out that preservation and conservation of archives and records are faced with a number of challenges especially in developing countries like Africa where information communication technology is being incorporated little by little into every sphere of information science operation. Parts of the challenges according to (Yaya et al., 2015; Toyo, 2017) are:

Changes in Hardware and Software: Incessant changes in hardware and software create huge pressure on archival institutions due to preservation of digital archival collections centres on the interim mechanism for storing the digital information, migration to new form and enabling long term access. One of the pressing issues confronting the durability of digital collection in third world countries is not only the storage media dilapidation but the challenge of rapidly changing storage devices. Unlike analogue information which places emphasis on the preservation of physical artefacts, it is the informational contents of the digitized materials that are preserved. It will, therefore, take a conscious effort of archivists in Africa and other developing countries in the world to make sure that the digital information is preserved since changing in software and hardware is creating problems for staff working on digital durability (Besser, 1999:22; Decker, 2015:17).

Inadequate Funding: Digital projects are expensive. Digitization of records requires huge funding as a result of the constant software and hardware upgrading, and rapid hike in the cost of subscription to electronic databases that make them be easily accessed by information seekers worldwide (Jain, 2012).

Computer Phobia: As a result of the inadequate skills in information technology in Africa, many information practitioners including traditional librarians, record keepers and archivists are conservatives and have a phobia for computers. Due to the generational gaps between the new and old professionals, computers are seen as a challenge to their status as experts (Rothman, 2013). Thus, they find it difficult to cope or measure up with the requirements of the electronic/digital age, and hitherto too reluctant to forgo the old practices for new ones (Ojedokun, 2008). Successful integration of information handling technologies in developing countries demands an ability to conquer staff and personal resistance to such innovation.

Technical Expertise: One of the stringent challenges to preservation and conservation of records in the developing nations is educating the record keepers in the community on the best way to handle records. This problem is compounded because the preservation of records is not at the centre of most curricula. Like in the Nigeria case, there are few places where one can receive formal specialized education in preservation and conservation of archives and records. In addition, inadequate technical expertise is common in African countries (Adeyemi, 2012).

Shortage of Personnel/Human Capital: The limited number of librarians that have basic knowledge in computer science and its applications work in archive and records units. Therefore, the result is frequent break down of ICT facilities and disruption of services in digitized records units. In most African countries, human resources with appropriate skills, competencies and attitude are not readily available to inaugurate, integrate and sustain

digitization project and most Africa nations are still lagging behind in technological and telecommunication infrastructure (Otebulu & Ume, 2015, Toyo, 2017).

The paucity of Technological Infrastructure: Constant power outage is one of the serious challenges to digitization in Africa. This has negative effects of damaging digital/ICT equipment and where there is standby alternative power generation, the cost of running them is unbearable. In furtherance to this is the harsh environment of Sub-Sahara Africa which is not always friendly with technology equipment. As reported by Zulu (2008), most African countries do not have adequate and reliable supply of electricity which consequently makes it impossible to maintain a conducive and sustainable technological environment suitable for digitization project in the continent. Similarly, telecommunications infrastructure in most Africa countries are either inadequate or poorly developed and some Africa nations have modern digital and packet switching telecommunications facilities needed for data transmission.

Technological Obsolescence: The continuous changes in computer hardware and software cause technological obsolescence which is a challenge to digitization and records preservation in Africa. It causes the loss of the means to access information in digital form. Technological out-datedness is caused by continuing upgrade in operation systems, programming language application and storage media. It is on this note that, Alegbeleye (2009) was of the view that digital archives should be transcribed in every ten to twenty years to guide against technological obsolescence.

Lack of Legislation/Policy: Many African countries do not have policy or legislation in place that guides the management of records and information. On this note, Wamukoya and Mutula (2005) observed that legislators in Africa are neither aware of nor conversant with the requirements of digital preservation and for that reason, they either ignore or inadequately cover digital preservation issues. The internet links is also a challenge to digitization due to copyright legislation. The copyright of software needed to access digital files, and the right to copyright for preservation has not been seriously implemented in most national legislation, and if permission for digitization cannot be obtained, digitization of such materials should not be processed.

Although many authors (e.g. Asproth, 2005, 2007; Kumar, 2012) emphasised that challenges are not only technical but other issues (organizational, legal and context) are as important as there has been little progress in this area.

Initiatives on Records Preservation across the World

A few research projects and initiatives are available that focused on the long-term preservation of electronic information and records, although they are generally dealing with overcoming challenges rather than systematic knowledge development (Asproth, 2005). The more important project/initiatives include:

InterPARES

The most common research project or initiative is the International Research on Permanent Authentic Records in Electronic Systems (InterPARES), which aims at development the

methodological and theoretical knowledge necessary to the durability of preservation of vital records created and/or maintained in digital form (InterPARES, 2018). This knowledge should provide the basis from which to formulate model policies, strategies and standards capable of ensuring the durability of such materials and the capacity of its users to trust its quality. At their fourth phase, InterPARES IV (2013-2018) deal with issues of authenticity, delves into the issues of reliability and accuracy from the perspective of the entire life-cycle of records, from creation to the archives where they are permanently kept and preserved. It addresses issues on records produced in complex digital environments in the course of artistic, scientific and e-government activities.

CEDARS

The actual purpose of CEDARS (Curl Exemplars in Digital Archives) project was to address strategic method and practice issues and provide guidance in the success stories for digital preservation. However, as indicated by Cedar (2002), the project was completed in March 2002.

CAMiLEON

The CAMiLEON (2003) with the full meaning Creative Archiving at Michigan and Leeds: Emulating the Old and New project is concerted effort undertaking by the University of Michigan (USA) and Leeds in the UK, funded by the Joint Information Systems Committee (JISC) and national science foundation (NSF). This initiative had the purpose of exploring the alternatives for long terms retention of the real functionality and look and feel of digital objects, to examine technology emulation as a long-term strategy for long term preservation and access to digital objects, and to consider where and how emulation fits into a suite of digital preservation strategies.

NEDLIB

NEDLIB (Networked European Deposit Library) is a collaborative project of European national libraries. Its purpose was to construct the basic infrastructure upon which a network European deposit library can be built. The objectives of Nedlib concur with the mission of national deposit libraries to ensure that electronic publications can be used now and later (The NEDLIB project, 1999).

MINERVA

Ministerial Network for Valorizing Activities in Digitization) Web preservation project was initiated to a broad program to collect and preserve primary source materials (Arms, 2001). A multi-disciplinary team of library staff representing cataloguing, legal, public services, and technology services is studying methods to evaluate, select, collect, catalogue, provide access to, and preserve these materials for future researchers.

PANDORA

The overall purpose of PANDORA with the full meaning (Preserving and Accessing Networked Documentary Resources of Australia) project is to develop and implement

processes for the capture, archiving, and provision of long-term access to electronic publications of the Australians selected for national preservation (National Library of Australia, 2013).

VERS

VERS is otherwise known as the Victorian Electronic Records Strategy) offer a solution to the problem of capturing, managing and preserving electronic records. VERS is model for standards, guidance, training, consultancy and implementation projects which focused on the objective to reliably and authentically archiving electronic records (Public Record Office Victoria, 2018).

ERA

The Electronic Records Archive (ERA) have the purpose to be a comprehensive, systematic, and dynamic means for preserving virtually all kind of digital records, free from relying on any specific hardware for software (National Archives, 2016).

Methods of Preservation of Records with the use of ICTs

Due to the advent of ICT, a number of preservation methods of records have now been invented. While some are currently fading out, other new ones are emerging. Some of these methods include but not limited to: Photocopying using photocopying machines, controlling pollution using air filter systems to save Images of materials from fading or dirtying by pollutants, controlling light using devices like lighting with bulbs removed or filters over lights and using a camera to measure light levels controlling temperature and relative humidity using various monitoring technology including thermo hygroph, writing hygrometer, thermometers, digital reproduction using digital media, including optical disks, CD-ROM disks, reprography using devices such as reader-printer, rewind bench, splicer microfilm, microfiche, micro film reader and so on. Others that are worthy to mention are:

Sensing Technologies: They are the equipment that collects data or information translate them to a form that can be understood by computer. These sensing technologies are sensor, scanner, keyboard, mouse, electronic pen, touch or digital board, bar code or reader, voice recognition system and others.

Communication Technologies: These are facilities that allow records to be transferred from the source to the user. They are used mostly to overcome challenges of records/information transfer such as speed and distance. Examples of such equipment are facsimile machine (fax), telecommunication system, telephone, email, internet, teleconferencing, and electronic bulletin boards, among others.

Display Technologies: They referred to as output devices that constitute the interface between sensing, communication, technologies and users. Examples are computer screen such visual display unit (VDU) or monitor, printer, television and others.

Analysis Technologies: They are technologies that assist in querying of data, records analysis, in-depth query for answers from simple to complex phenomena in research procedures.

Storage Technologies: They are technologies that facilitate efficient and effective storage of records, the information in a form that can be easily accessed. They are magnetic tapes, disks CD-ROMs, Optical disks, cassettes and others.

Other methods that are not ICTs inclusive but not limited to (Kumar, 2012) are Testing of P.H using testing paper and P.H pen so as to find the acidity of the information material so as to find the favourable condition for its storage, avoiding bad management habits like leaking figures when opening documents underlining should be avoided, fumigation that is treating documents with toxic chemicals to per cent insect monitoring light levels.

Fundamentally, Ojo and Ugwuanyi (2006) highlighted various types of ICT facilities used to enable the preservation and management of records. They include but not limited to:

Websites: Websites are a collection of related web documents that web servers make available to the users (public). Websites contain index page or home page displayed as users enter the site.

Email: Otherwise known as electronic mail. This is usually accessed through the internet and provide an instant way to send or receive correspondence.

Compact Disk: Read-only memory (CD-ROM): CD-ROM is an optical-disk used to store recorded text, graphics and sound such as music CDs. CD-ROM is a read only disk. Read only disk implies that the manufacturer cannot be written to or erase the user. It can store as much as 650 megabytes of data which is equivalent to 300,000 pages of text.

Internet: This referred to as the interconnected computer networks. One of the most prominent ICT facilities in the digital era. Internet services are usually on the airwaves and can only be downloaded by a local carrier or internet service provider. It contains information on nearly everything and varieties of knowledge are available through it. These are of permanent values and can be accessed anytime they are needed.

In other words (Chidiobi, 2015) emphasized some importance of ICT in the record management and preservation indicating that it is helping in promoting and maintaining standard and quality work at a higher level of time compare to traditional labour, it saves cost, time and labour and increases efficiency and productivity.

CONCLUSION

This paper has been able to discussed issues relating to the role of technology in the preservation of records in the digital age. The paper addressed other issues such as global initiatives on the preservation of records, methods of digital preservation of records and constraints to the preservation of records. It is evident that most organizations are not adopting ICT facilities to a great extent in record management and preservation. It should be noted that managing records manually will not yield any positive results because preservation demands clear strategies, workflow and organizational structures, standards and common metadata, new competencies as well as cooperation of numerous professions from traditional preservation management to computing science. Therefore, it is the right time for library and information scientists, informatics and computer science researchers to address the issue of electronic

information preservation more importantly. All of these are interconnected and imply that a crucial strategy is needed in order to preserve records in this digital age.

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