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The Impact of Professional and Non-professional Teachers' ICT Competencies in Secondary Schools in Nigeria

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Abstract

This research paper sets out to identify and evaluate the relevant strategies professional and non-professional ICT instructional material utilization competencies play in stimulating students' academic achievement during and after instruction. To achieve the purpose of this study, several statistical procedures were employed and the used tool was simple to meet the need of the categories of respondents used. The results of the findings points out that variety of techniques are needed for teachers to effectively utilize ICT instructional materials in the teaching and learning processes. The findings also revealed that there are significant differences in the effectiveness between professionally trained teachers and untrained teachers in their ICT instructional material utilization competencies.

Keywords: Education, academic achievement, learning processes.

Background and Purpose to the Study

The use of information and communication technology (ICT) is becoming an integral part of education in many parts of the globe (Sala, 2004; Kuntoro & Al-Hawamdeh, 2003; Leidner & Jarvenpaa, 1993). Nigeria is not left behind as ICT gradually finds its way into the educational systems (Ajayi, n.d.; Darkwa & Mazibuko, 2000; Brown, 2002; Darkwa & Eskow, 2000) despite chronic limitations brought about by economic disadvantages (Adesola, 1991). Fundamentally, education is a discipline like any other; it is a branch of human knowledge, which is basically concerned with getting the young in the society prepared when they come of age (Ezewu 1983, p. 31). According to Gbamanja, (1989, p. 131), education is a process, which seeks to change the behavior of a learner. Overall, behaviorist view education as the process of changing the behavioral patterns of people. Behavior in this sense refers to the way we change the learner, his or her thinking, his or her feelings and his or her overt actions (Hergenhahn & Olson, 1997).

Thus, education is the process by which society deliberately transmits its cultural heritage through schools, colleges, universities and other institutions (Gbemanja, 1989). In order to achieve the above-mentioned purposes in education, information and communication technology (ICT) one could argue is an essential ingredient that could help bring these gains and benefits to the fore. Realistically, several researchers and commentators in the developed West admitted that

problems abound in educational systems that ICT could help improve (Leidner & Jarvenpaa, 1993). In the same vein, similar problems would be expected in the educational sector of many developing countries (see for example, Adesola, 1991; Anyamele, 2004). However, the Republic of South African is adept at integrating ICT for national development and even within their educational sectors (Fielden, 1998; Lund, 1998) than other countries in Sub-Saharan Africa, including Nigeria.

Some teachers in Nigerian secondary schools find it very difficult to effectively tally their ICT instructional materials such as computers, audio visual aids, slides, video clip, electronic white boards, and electronic conferencing materials and so on, to the goals of their instructional objectives, which instigate information search and attribution formulation. That is why this exploration measured and examined the ways in which ICT instructional materials used in schools are deemed acceptable and good for students' academic achievements from the perspective of a developing country. It looks at teachers' appropriate selection, preparation and use of relevant ICT instructional material, as well as their effectiveness in the operation of projected equipments to aid teaching and learning. Besides, we also recognise that the intimidating work environment has been insinuated to suggest a sense of weakness towards teachers' ICT instructional material utilization competencies in Nigerian secondary schools because of the shortage of fund to purchase the needed ICT instructional materials. Thus, effort towards quality education is difficult to achieve given these situation (Adesola 1991, pp. 121-133; Ajayi [n.d]).

Besides, the importance of being able to explain and predict such instructional material utilization competencies has led to a number of studies particularly from the West. Report from educational research literature concerning ICT instructional material utilization indicates that ICT material utilization competencies tend to vary with teachers. Although professional teachers as against non-professional teacher has been recorded as the most dominant with high ICT competency rate, more especially from the West. This observation has been attributed to their exposure to basic theories and practices of educational technology. For example, Baker and Freebody (1989a) showed how instructional materials designed for use in schools are actually tailored to fit into particular pedagogical strategy. Moreover, more significant and generally evidences abound that this area of discourse are distinct more in the West than in the Sub-Saharan Africa. A search of the Internet and extensive library search showed that there are limited research publications in Nigeria as regards this area of discourse, and the ones that existed were very narrow and did not focus on comparing the role played amid teachers with academic qualification and their counterpart who hold professional teaching qualification, which this study has given considerable insights.

In Nigeria, teachers who are academically qualified (untrained teachers) and those that are professionally qualified (trained teachers) are engaged to carry out instructional processes. By academically qualified teachers, I mean teachers who have academic training as a result of enrolment into an educational institution as a result obtain qualifications such as HND, B.Sc., B.A, M.A, M.Sc., and so on. While professionally qualified teachers, are teachers who get professional training that gives them professional knowledge, skills, techniques, aptitude as different from the general education. They hold professional teaching qualifications, for example, B.Sc. Ed, B.A Ed, B. Ed, M. Ed, and so on.

This study therefore investigated teachers with academic qualification and their counterpart with professional teaching qualification. It theoretically and empirically analysed teachers' ICT instructional material utilisation competencies and how it affects educational achievements of students and at the same time improve school effectiveness. Therefore, eliciting information from secondary school teachers, principals and education supervisors from the Ministry of Education and Post Primary Schools Board in Rivers State of Nigeria constituted an approach to reach this end. It is hoped that this exploration might produce remedies that can be taken to develop teachers' ICT material utilisation competencies. As well as assist educational planners and policy makers in their decision about the employability of teachers. However, it does not mean that this research is an end in itself; rather it is a means that might help in resolving the problems mentioned in this study.

Research hypothesis

The research hypothesis for this study states that there are no significant differences in the effectiveness between professional and non-professional teachers towards their ICT instructional material utilization competencies.

Literature Review

Teachers' ICT Material Utilization Competencies

Teachers like any other professional workers need essential tools to do their work most excellently. Certainly, it is true that the central figures in any learning situation are always the students and the teachers. But it is equally true that learning may be greatly enhanced by the utilization of the many resources available in the school and through various school agencies. Nevertheless, teacher's planning of effective learning activities will be easier, less time consuming and often vastly expanded in potential scope when teachers know precisely what type of ICT materials are available to them and when to draw upon them regularly to affect their teaching ability (Brown, Lewis & Harcleroad, 1959, p. 47). Therefore, it is essentially important then that teachers be thoroughly acquainted to the teaching resources and services available to them and that they have a clear understanding of the essentials of a functional materials-selection program. Thus, many of the materials needed for effective teaching are used often enough to warrant their being part of every classroom's basic equipment. However, some at the other extreme are material—often relatively expensive and needed in individual classes rarely and for short periods—which serves the basic need of an educational system. As a result, teachers are concerned about the ready availability of appropriate ICT instructional materials because they know how much such tools influence teaching and the quality of learning in the classroom (Ibid, p. 48).

For instance, the University of North Texas (UNT) College of Education holds as its conceptual framework the idea that educators are guides for engaged learners. This concept is portrayed visually as a compass, which represents the tools educators' employ as they orient students in the exploration of landscapes for learning. The engagement of learners requires simultaneous commitment to academic knowledge bases and to learner-centered practice.

Competency development in all UNT programs for educators is paramount. It sees professional communication as very important, hence, effective interpersonal and professional oral and written communication that includes appropriate applications of information and communication technology (ICT) during instruction. The idea behind ICT in education at UNT is to develop professionally competent teachers who can handle instructional processes and appropriately use the available instructional materials in a school environment to affect teaching and learning. In addition, the purposes of effective teacher training, are (1) to increase student teachers awareness of theories of instruction, (2) to assist students in the development of criteria to select and evaluate teaching methods and instructional materials, (3) to provide knowledge and analytical tools so that student teachers may expand their repertoire of teaching methods, and (4) to encourage student teachers to engage in reflective practices. It focuses on the derivation of appropriate methods and techniques from basic principles of learning. Student teachers will develop working skills needed in cooperative planning, selecting and organising of teaching materials and its utilization to meet the environment and its technological changes because the pace of technological change is quickening. However, a number of critics of schools charge that secondary schools have taken too little action to assure that their graduates have the technical skills needed to function in our increasingly technologically oriented society (Barlow, 1992).

Meanwhile secondary schools today especially in the developed world are under pressure to make students more personally familiar with emerging technologies as opposed to what is happening in developing countries especially Sub-Saharan Africa. However, this trend has in turn influenced teacher education programs to appropriately train pre-service teachers. There is a general belief that students graduating from the secondary schools must have levels of expertise beyond a simple ability to use current technology, and what is needed in technological competence (Armstrong & Savage, 1994). This implies a sophisticated cognisance of technologies that includes ability to see novel applications and to expand the nature of the technologies usage themselves in school (Dickman, Van Sickle & Bogan, 1997).

Fundamentally, educational technology introduces teachers to the evaluation, selection, and use of audiovisual materials and equipments including films, slides, transparencies, projectors, globes, charts, maps, bulletin boards, plus programmed materials, information retrieval systems, and instructional television during teaching and learning processes (Ololube, 1997). Nonetheless, one important difference between some educational practices today and those of a generation ago is the relative emphasis teachers put upon doing as a means of teaching and learning. Today's schools give more attention to realistic, lifelike learning situations, which go well beyond word-of-mouth explanations by the teacher or word-in-print explanation of books. One means of developing this realism is through classroom construction activities, which challenges students to solve instructional problems in many fields of study by transforming simple, inexpensive instructional materials into forms which help them and other people to learn (Brown, Lewis & Harcleroad, 1959).

The Role of Teachers' in the Use of ICT Instructional Materials

For some time now, there were predictions that new teaching and learning technology would replace teachers, textbooks and even schools. It was also anticipated that the major method of learning by 2000 would involve for example, the use of modern technology like computers at all levels and in almost all subject areas (Borg, 1980). However, Crook (1994) found that this prediction does not appear to be true. Cuban (1986) and Cohen (1987, pp. 153-170) on the other hand claim that the use of ICT has to fit into the teachers' pedagogical view of teaching and learning, and if introduction of computers for instance in schools are to be successful, one must start with the question of why they should be used and not how they should be used. Yet, it appears that technology is looked upon as having a supplementary role in teaching and that it should be organized according to the view of most educators and parents (Postholm *et al*., 2002). Cuban (1993) maintains that the "dominant cultural norms" with respect to learning, instruction and the nature of knowledge almost have a neutralizing effect on development. Nevertheless, Postholm *et al*. (2002) on the other hand argues that some features of Information Communication Technology (ICT) must be seen as a potential that has to be implemented in contexts of learning.

Although in this direction, Vygotsky (1978) developed the concept of the zone of proximal development (ZPD) that has had a great effect on how we regard teacher's instruction and assessment in assisting students' level of development. This is reinforced by appropriate use of instructional materials. This concept is defined as:

> *The distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (p. 86).*

This means that teachers can help students to perform more with their help than without it. Conversely, Wood, Bruner and Ross (1976, pp. 89-100) use the term "scaffolding" to describe an adult helping a child to carry out a task or achieve goals the child could not reach without this help. They also stated that teachers need to know how to solve the task and also know about the performance qualities of their students before these goals can be achieved. However, Tharp and Gallimore (1988) argued that teachers also need to know how to scaffold the student, and also they developed a theory of scaffolding methods, which is based on the premise that a good teacher is a mater of simplification. It consists in assisting performance through the ZPD. Thus, teaching can be said to occur when assistance is offered at points in the ZPD at which performance requires assistance. In all, during the use of a particular instructional material, questioning is seen as a useful tool in assisting children in their learning processes, which leads them further into their ZPD. In school, children often have to answer questions. Questions are posed to find out if students have understood what they expected to learn. Such questions capture student's actual developmental level (Austin, Dwyer & Freebody, 2003; Freiberg & Freebody, 1995).

Research Methodology

Instrumentation

The participants used for this study responded to questions that employed a four-point likert-type scale (summated) of (4 = strongly agree; 3 = agree; 2 = disagree; and 1 = strongly disagree), which allows them to rate their perception on possible ICT material utilization competencies (selection of appropriate instructional material, preparation and use of instructional materials, and operation of projected tools). It was a rating scale that is considered approximately equal "attitude value" which subjects responded with degree of agreement or disagreement (intensity) (Kerlinger 1973, p. 496). Section "A" of the research questionnaire described respondents' background information, they include: gender, age, status, subject's taught, academic qualification, professional qualification and length of service. While section "B" comprised of possible ICT instructional material utilization competencies. The plainness of the questionnaire was based on the fact that since different category of people were chosen as my respondents, the need to make the questionnaire as simple as possible was inevitable. The questionnaire was also designed with the help of faculty members to elicit information from the respondents that will help gather information. It equally has face validity because the feedback from faculty members helped in assessing that the measure apparently reflects the content of the concept in question.

Research population and Respondents Background information

The research population for this study was drawn from Rivers State (accessible) of Nigeria. It is one of the States in the south-south geo-political zone of Nigeria. The population comprises of 10 (3.3%) principals, subject heads and teachers 270 (90%) from ten (10) randomly selected secondary schools, as well as supervisors 20 (6.7%) from the Ministry of Education and Post Primary Schools Board. The reasons for choosing subject heads is that they directly supervise teachers activities as regards teaching and therefore stands a better chances of measuring their teachers' input and output. As the supervisors from the Ministry of Education and the Post Primary Schools Board were chosen for this study because they routinely supervise the effectiveness of teachers performances. Out of the total number of respondents 76 (25.3%) were academically qualified, while 224 (74.7%) were professionally qualified. See figure 1 for the rest of the respondents' background information.

Data Analysis Procedures

This study is part of an exploration and a comparative study that examined the professional competencies of academically qualified and professionally qualified teachers' job effectiveness (Ololube, 2005a, 2005b). Therefore, to arrive at this study intended comparative analyses several sets of statistical analyses were conducted using SPSS version 11.5 of a computer programme: Mean and Standard Deviation, ANOVA, T-test of significance and Cross Tabulation (N-300). One-way-analysis of variance (ANOVA) was employed to test the relationship between variables and respondents' background information. The t-test of significance was computed to test for statistical significant differences in the variables. It is a statistical significant set at $p < 0.05$ to assess if the researcher's level of confidence observed in the sample also exists in the population.

For a more simplistic and easy comprehension of the data analysis in this study, Cross Tabulation was employed because it is one of the simplest and the most frequently used ways of demonstrating the presence or absence of a relationship (Bryman & Cramer 1990, p. 151; 2001, p. 159).

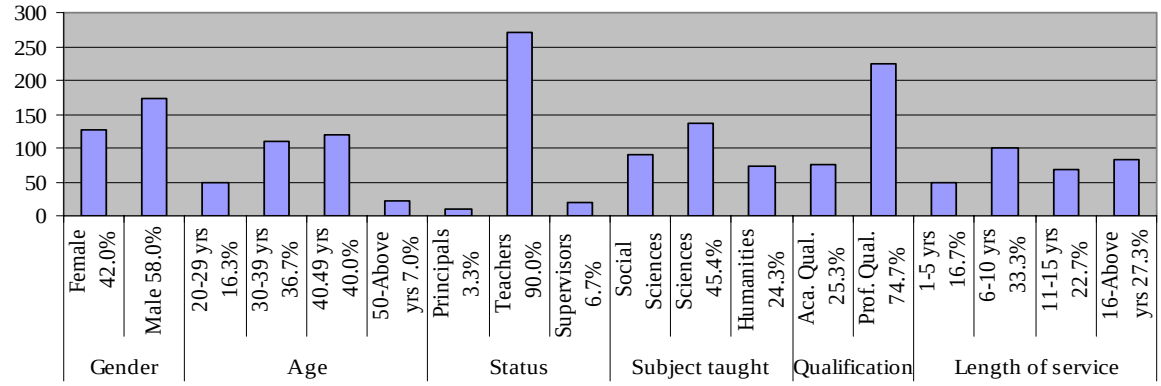

Figure 1. Responder's background information

Reliability of the research instrument

A measurement to assess reliability of this research instrument was seen as suitable in this investigation since the respondents more especially teachers had answered the questions because they were directly affected in that the study focused on their ICT material utilization competencies which is part of a determinant for their professional competencies. A quantitative analysis of the inquiry was performed to statistically test the reliability of the research instrument because in research statistics, when a research instrument has been ascertained of its reliability it now give bases for continuity. Thus, it was tested with Cronbach alpha coefficient, and a reliability coefficient of 0.91 was obtained, which showed a strong reliability of the research instrument (see Bryman & Cramer 1990, p. 71; 2001, p. 63; Saunders, Lewis & Thornhill 2000, p. 361).

Results and Discussion

The first set of analyses was based on a set of pooled questions that evaluated respondents' perception on variable associated with teachers' ICT material utilization competencies using mean and standard deviation. These questions were designed to elicit information that were related specifically to teachers instructional effectiveness. It is aimed at assessing teachers' appropriate selection, preparation and use of ICT instructional materials during instructional processes and its input towards teaching effectiveness, as well as on teachers' effective operation of projected tools. Thus, all the results were identical. On the appropriate selection of instructional material, the professionally qualified teachers *(M = 3.74 and SD = 0.44)* against their counterpart who are academically qualified *(M = 1.90 and SD = 0.82)* significantly credited trained teachers to effective coordination of their effort in choosing the right type of ICT instructional materials. Regarding respondents' perception on the preparation and use of

instructional materials effectively, the result showed to advantage that professional teachers have more propensity in carrying out this function more than the academically qualified teachers. This is shown in their mean and standard deviation of *(M = 3.67 and SD = 0.51 against M = 1.96 and SD = 0.74)* respectively. Whereas the same progression was notices on how trained teachers and non-trained teachers operate projected tools. This is also evident in their mean and standard deviation *(M = 3.64 and SD = 0.49 which is not in favor of M = 2.33 and SD = 0.80).* (Table 1).

Table 1. Means and standard deviations of differences between professionally trained and non-professionally trained teachers

Competencies (Variables) Items	*Trained Teachers*		*Untrained Teachers*	
	Mean	SD	Mean	SD
Selection of Appropriate	3,74	,44	1,90	,82
Preparation and Use	3,67	,51	1,96	,74
Operate projected Tools	3,64	,49	2,33	,80
Total	3,68	0,48	2,06	0,79

The results of the means and standard deviations in Table 1, between the means of professionally trained and untrained teachers indicates that varieties of techniques are needed for teachers to effectively utilize ICT instructional materials in the teaching and learning processes.

The second set of statistical analysis was a T-test analysis of paired sample statistics of respondents' perception of teachers' instructional material utilization competencies. The purpose of this was to further verify my analytical information; the T-test analysis was aimed at determining if there were significant differences between respondents' means. The result demonstrated that there were significant differences between academically qualified teachers and professionally qualified teachers in all the variables. SPSS version 11.5 displays it as $p < 0.000$ significant levels. This does not mean that the probability is 0. It is less than $p < 0.0005$. The highest t-value is –23.78 and the lowest t-value is –32.15, Df = 299, $p < 0.000$, Therefore, the H_0. was rejected (Nworgu 1991, p.155; Marija 1997, p. 230; Bryman & Cramer 2001, p. 108). See Table 2 for details.

One-Way-Analysis of Variance (ANOVA) was the third statistical analysis that was performed to test the relationship between variables and respondents' background information. They were computed and the result showed that no significant difference exist in the respondents' opinion *(F = 2.11, Df = 299, p > 0.39).* Finally, Cross Tabulation was employed to test the degree of agreement and disagreement. It was used because of its simplistic nature and it is most frequently used to explain or predict the presence or absence of a relationship in educational research. As high as 77.7 % of the respondents agree that professionally qualified teachers are prone to effectively select, operate and apply the use of ICT instructional materials in the classroom environment compared to 22.3 % of their counterparts who are academically qualified. The

unique finding in this study was that, it was surprising to note that even teachers who are academically qualified favored professional teaching.

Table 2. Two-tailed test of difference between paired means

Paired Variables	Paired Mean	SD.	Std. Error mean	T	Df	Significance (2-tailed)
Selection of Appropriate	-1.83	.99	.057	-32.15	299	.000
Preparation and Use	-1.71	.91	.053	-32.45	299	.000
Operate projected Tools	-1.31	.95	.055	-23.78	299	.000

From the study, all the results revealed that professional (trained) teachers select appropriate teaching materials, prepare and use instructional materials effectively, as well as operate projected tools effectively as against the non-professional (untrained) teacher. Nevertheless, the educational environment has been changed remarkably due to advancement in the teaching and learning processes. If teachers plan and implement the teaching-learning activities as their main body of education with their students, it is a fundamental point for them to have in mind the competence of ICT material utilization to succeed in their instructional processes. Though the material utilization intelligence has been increased outstandingly due to the requirements of the times and environmental factors, although we recognize that teachers' actual competence of the ICT material utilization is not high enough to meet these challenges (Sung, 2000).

In support of the results in this study, Abdal-Haqq (1995), Barker, *et al.* (1995), Ayersman, *et al.* (1996), Basu (1997) and Lancaster (1999) also indicated in their research that teachers who are professionally trained demonstrate a sound understanding of Information and Communication Technology (ICT) operations and concepts, use productivity tools to enhance professional tasks such as correspondence, assessment, classroom materials, presentations, etc. Professional teachers demonstrate introductory knowledge, skills, and understanding of concepts related to the use of materials needed for instructional process and the continual growth in technology knowledge and skills to stay abreast of current and emerging technologies, and informed decisions regarding the use of technology in support of student learning.

To also give credence to this study's findings, according to one Internet source, a course like 'educational technology' is designed to equip teacher candidates with the knowledge and skills necessary to use technology in the field of education. It is established, and to maintain rigorous standards for teacher candidates' knowledge and performance, to ensure that all students achieve the predetermined aims and objectives of education. Thereby, working from a solid content background, professional teachers demonstrate proficient and flexible use of different instructional materials and ways of teaching to engage actively all students in learning. Moreover, professional teacher are well versed in the characteristics of students of different ages, abilities, and cultural backgrounds. They are skilled in integrating technology into instruction and creating an environment in which all students can be successful and want to learn. They know when and

how to assess learning through various forms of traditional and authentic assessments. However, it is saddening to say that Nigeria in particular and other Sub-Saharan African countries are far behind in terms of educational technology. The educational technology bases of these countries are still at its embryonic stages.

However good teaching according to Tharp and Gallimore (1998, p. 97) consist in assisting performance through the Zones for Proximal Development (ZPD) which is reinforced by appropriate use of instructional materials. Teaching is said to occur when assistance is offered at points in the ZPD at which performance requires assistance. In any case, such assistance of performance has been described as *scaffolding*, a metaphor first used by Wood, Bruner and Ross (cf., 1976) to describe the ideal role of a teacher. Scaffolding, however does not simplify the task; it holds the task difficulty constant, while simplifying the child's role by means of graduated assistance from the adult/expert (Tharp and Gallimore 1998, p. 99). Conversely, some educational researchers have therefore suggested that the concepts themselves cannot map well on the pedagogic realities of the classroom education. Also, other researchers have remarked that the principles of scaffolding or ZPD are different and that the teacher must treat each child's learning individually. It is further argued that it is an unrealistic aspiration as far as most teachers and most classroom situations are concerned. However, Mercer and Fisher (1998, p. 113) accepted the ground for these criticisms, but see them as stimulus for research rather than as a reason to forsake the neo-Vygotskian framework. Within a neo-Vygotskian framework, learning and problem-solving are seen as context-bound processes, so that the level of understanding achieved by individuals in specific settings is recognized to be, in part at least, a function of those settings as dynamic contexts for cognitive activity (Crook 1991).

Nevertheless, according to Mercer and Fisher (1998, p. 114), through establishing a ZPD, a teacher or researcher may gain valuable insights into how a child may be encouraged to progress through the appropriate use of the right kind of instructional material. Although they further argued that children do not carry their ZPDs with them when they leave a classroom and a new task with a different teacher may generate quite different 'zones' for the same group of children. Though, scholars involved in educational research and the in-service training of teachers found the concept of 'scaffolding' a very useful tool in analytic discussions of teachers' pedagogic strategies (Tharp & Gallimore, 1998; Mercer & Fisher, 1998).

Conclusion

The main objective of this research has been to outline the complex role and explicitly state the significance of the need for professional and academic development in the education community. The joy and enthusiasm observed in this study led to the thinking that using professionally competent teachers in the teaching and learning processes may be a very good course of action, not only because the students will enjoy the instructional activities, but because they are valuable factors that will enhance the intellectual growth of both teachers and students. It was also identified that teachers' professional qualification improves their job effectiveness. The findings showed that professionally qualified teachers ensure quality in teaching-learning. To attain quality in teaching-learning *vis-à-vis* ICT material utilization competencies, school leaders have to rely on creating and sustaining a rich and conducive academic environment in which their students and teachers can thrive, learn and grow. Research has shown (e.g. Perry 1994; Whitty

1996; Olugbemiro, 2000) that professional teachers have a closer understanding of the activities within the school, and even of its potential activities, and strive to promote the stability of the academic environment. From the preceding discussion, the finding has shown that there are all-around roles that professional teachers play in effecting quality teaching in our schools.

It could be suggested also that the opinions of the respondents' showed that non-qualified teacher should be made to undergo the basic qualifying courses for teachers, in order to be exposed to the pedagogical skills in teaching to ensure technical competencies and functional specialization just as Qualified Teachers Status QTS is required in the UK. Professional training should be emphasized and the issue of experience played down. This is because experience without training could lead to under utilization of talents and the retention of mediocre that are not qualified but experienced. This is also aimed to avoid obsolescence (Kautto-Koivula 1997; Oloube 2004). Teacher education and training is a means of professional updating, which deals with all developmental functions, directed at the maintenance and enhancement of one's professional competence (Anyamele, 2004). Teacher's professional growth supports the idea that teacher education and training is an important factor in teachers' job effectiveness and development. This is so because teachers' education and training is generally considered to be essential for school effectiveness and improvement. It is further argued that teachers who are bent on improving their competence are likely to contribute, directly or indirectly to the growth of student's achievement. Equally, Javis (1983), Keen (1991), Creemers (1994) and Kautto-Koivula's (1997) studies concerning their experience in staff training and education clearly demonstrated the need to offer teachers better opportunity to educate and develop themselves in order to create understanding between their job and their effectiveness.

Limited attention has been given to ongoing professional development for those that are already trained (Day & Sachs, 2004, pp. 3-32; Grundy & Robison, 2004, pp. 146-166). The task of providing teacher education, however, does not end with the certification of teachers. Professional development is a very important part of teacher education. Providing professional development especially for teachers is therefore a challenge in teacher education. There has been no system of ongoing professional development and consequently no culture of professional development in Nigerian secondary schools. The matter of on-going professional development of teachers is particularly important given the poor performance of students in national and international examinations. Also another challenge for teachers in Nigerian secondary education is the need for research and development. It is necessary for teacher educators to understand the problems that plague schools and teachers to formulate relevant programs to prepare and support teachers. Therefore, there is a need for well-prepared and motivated teacher educators to undertake the task at hand.

Furthermore, current changes in technology, new advances in learning and the inherent challenges arising from curriculum renewal and reform requires that there is the need for radical changes in teaching and learning methodologies to conform with the current technological trends. Once the desirability of adopting rich and flexible curriculum frameworks has been recognized, then alternative ways will necessitate for promoting teaching and learning methodologies different from those used in the past. This will involve moving away from a rigid, prescriptive approach in classroom work (Pillai, 2001, p. 1) (see also, Bamgbose, 1992; Ihebuzor, 1992; Marinho, 1992; Emenanjo, 1995). The best practice of in-service is one that involves clients or

participants in planning their own program because according to Esu (1991, pp. 189-199) teachers are the best judges of what they need and are often in the best position to help ensure that activities planned are relevant. However, Esu reminded us that there are advantages as well as disadvantages associated with teachers' involvement in the planning process of the in-service training program. That is why some schools do not allow outsiders to partake in the organization of the program.

In general, Sub-Saharan African and Nigerian secondary schools in particular could follow initiatives from the West. Specifically, Institutes of Education and Faculties of Education of Universities alongside the government can pull resources in setting agendas for their nation's teacher education programs with respect to using ICT for national educational development processes. The availability of a clear objectives and goals and the resources to facilitate the adoption of ICT in Nigerian secondary school system is the starting point for educational development.

Limitations of this study

There were nevertheless some limitations in this study. First were the numbers of schools that could be included in the study, and second was the generalizability of the findings. Although I attempted to improve the generalizability of the results by inferring from a multiple case study, it would be difficult to conclude from only ten schools, the Ministry of Education and the Post Primary Schools Board in Rivers State out of the thousands in Nigeria. This may not represent the opinions of other teachers in other parts of the country. As this is the case, it will be inappropriate for one to assume that their opinions represent those of other teachers in Nigeria and outside. However, notwithstanding these limitations this study followed the principles of interpretation research, which is not a certainty to seek generalization from the setting of a population, but rather to supply an understanding of the deeper structure of the phenomenon of this study. Interpretation research according to Kerlinger (1973), takes the results of analysis, makes an inference pertinent to the research relations studied, and draws conclusion about these relations. The researcher, who interprets research results, searches them for their meaning and implications. As a result, I did this in two ways. First, the relations within this research study and the way its data were interpreted. Second, the broader meanings of this research data were sought (see, Kerlinger, 1973, pp. 234-235). However, additional investigation in this direction will be in order. A new perspective on teachers material utilization competencies, which do not only take into consideration of the unique characteristics of the variables used in this study, but their environmental and cultural derivation is thus recommended. As well, further studies could investigate what specific measures are taken by Sub-Saharan African countries to hasten the spread of ICT in their educational system.

References

Abdal-Haqq, I. (1995). Infusing Technology into Preservice Teacher Education. *ERIC Digest.*

Adesola, A. O. (1991). The Nigerian University Systems: Meeting the Challeges of growth in Depressed Economy. *Higher Education, 21, 121- 133.*

Ajayi, G. O. (n. d). *Some Aspects of Information Communication Technology Development in Africa*. Retrieved August, 14, 2004, from http://www.tenet.res.in/commsphere/s8.1.pdf

Armstrong, D. G., & Savage, T. V. (1994). *Secondary Education.* New York: Macmillan College Publishing Company.

Anyamele, S. C. (2004). *Institutional Management in Higher Education: A Study of Leadership Approaches to Quality Improvement in University Management*. Nigerian and Finnish Cases. Unpublished doctoral dissertation, University of Helsinki, Finland.

Austin, H., Dwyer, B. & Freebody, P. (2003). *Schooling the Child*. London: RoutledgeFalmer.

Ayersman, D. J., et al. (1996, June 9-13). Creating a Computer Competency Requirement for Mary Washington College Students. 8pp. In *Proceedings of the Summer Conference of the Association of Small Computer Users in Education* (ASCUE). North Myrtle Beach, SC.

Baker, C. D. & Freebody, P. (1989a). Possible Words and Possible People: Interpretive Challenges in Beginning School Reading Books'. *Australia Journal of Reading, 11*(2), 95-104.

Bamgbose, A. (1992). *Implementation strategies of the language provisions of the National Policy on Education.* Abuja, NERDC.

Barker, B. O., et al. (1995, February 12-15) Reforming Teacher Education through the Integration of Advanced Technologies: Case Study Report of a College Model. Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education, Washington, DC

Barlow, J. (1992). High Schools Aren't Working. *Houston Chronicle, E1*

Basu, C. K. (1997, February 18-20). Integration of Technology Education in Basic and General Education Curriculum in Asia-Pacific Countries. Paper presented at the Asia-Pacific School Principals' Forum, *Managing Schools for the 21st Century*, Manila, Philippines.

Borg, A. (1980). Learning through Graphics. In R. Taylor (ed.), *The Computer in the School: Tutor, Tool, Tutee.* New York: Teachers College Press.

Brown, J. W., Lewis, R. B. & Harcleroad, F. F. (1959). A-V Instruction Materials and Methods. New York: McGraw-Hill Book Company.

Brown, I. (2002). Individual and technological factors affecting perceived ease of use of web-based learning technologies in a developing country. *Electronic Journal of Information Systems in Developing Countries*, *9*(5), 1-15.

Bryman, A. & Cramer, D. (2001). *Quantitative Data Analysis for Social Scientists*. London: Routledge.

Bryman, A. & Cramer, D. (2001). *Quantitative Data Analysis with SPSS Release 10 for Windows: A Guide for Social Scientists*. Philadelphia: Routledge: Taylor and Francis Group.

Creemers, B. P. M. (1994). *The Effective Classroom*. London: Caseell.

Cohen, D. K. (1987). Educational Technology, Policy and Practice. *Educational Evaluation and Policy Analysis*, *9*(2), 153-170.

Crook, C. (1994). *Computers and the Collaborative Experience of Learning*. London and New York: Routledge.

Cuban, L. (1986). *Teachers and Machines: The Classroom Use of Technology since 1920*. New York: Teachers College Press.

Cuban, L. (1993). *How Teachers Taught: Constancy and Change in American Classrooms 1890-1990*. New York: Teachers College Press.

Darkwa, O., & Mazibuko, F. (2000). Creating Virtual Learning Communities in Africa: Challenges and Prospects. *First Monday, 5*(5).

Darkwa, O. K., & Eskow, S. (2000). Creating an African Virtual Community College: Issues and Challenges. *First Monday, 5*(11).

Day, C., & Sachs, J. (Eds.). (2004). *International Handbook on the Continuing Professional Development of Teachers,* pp. 3-32. Berkshire: Open University Press.

Dickman, C. B., Van Sickle, M., & Bogan, M. (1997). *Integration and Utilization of Technology by Secondary Pre-service Science Teachers*. Retrieved August 10, 2003, from www.ed.pus.edu/CI/journal/96pap19.htm

Emenanjo, E. N. (1992). Languages and the national policy on education: implications and prospect. In B. Ipaye (Ed.), *Education in Nigeria: past, present and future: essays in honour of Professor A.B. Fafunwa* (Vol. 1). Lagos: Macmillan.

Esu, A. E. O. (1991). In-service Teacher Education in Nigeria: A Case Study. *Journal of Education for Teaching, 17*(2), 189-99.

Ezewu, E. (1983). *Sociology of Education*. Lagos: Longman Group.

Fielden, J. (1998, June). Collaboration in Administrative Computing: The Issues. *Association of Commonwealth Universities (ACU)*, ABCD, 134, 18-21.

Freiberg, J. & Freebody, P. (1995). Analysing Literacy Events in Classrooms and Homes: Conversation-Analytic Approaches. In P. Freebody, C. Ludwig & S. Gunn (Eds.), *Everyday Literacy Practices In and Out of Schools in Low Socio-Economic Urban Communities* (pp. 185-372).

Gbamanja P. T. (1989). *Essentials of Curriculum and Instruction, Theory and Practice*. Port Harcourt: Pam Unique Publishing Company.

Grundy, S. & Robison, J. (2004). Teacher Professional Development: themes and trends in the recent Australian experience. In C. Day & J. Sachs (Eds.), *International Handbook on the Continuing Professional Development of Teachers*. Berkshire: Open University Press.

Hergenhahn, B. R., & Olson, M. H. (1997). *An Introduction to Theories of Learning* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Ihebuzor, N. (1992). *Language curriculum development in Nigeria: issues, problems and prospects.* Lagos, Federal Ministry of Education, ICNPE. (National School Curriculum Review conference proceedings.)

Jencks, et al (1972). *Inequality.* New York: Basic Books.

Javis, P. (1983). *Professional Education.* London: Croom Helm

Kautto-Koivula, K. (1997). *Degree-Oriented Professional Adult Education in the Work Environment.* A Case Study of the Mian Determinants in the management of a Long-term Technology Education Process. Unpublished doctoral dissertation, University of Tampere, Finland.

Keen, K. (1991). Competence - What is it and how can it be Developed. *Proceedings of the 1991 Ette Conference*, 61-77.

Kerlinger, F. N. (1973). *Foundation of Behavioral Research*. New York: N. Y. Holt Rienehart and Winston.

Kuntoro, R. D., & Al-Hawemdeh, S. (2003). E-learning in Higher in Institution in Indonesia. *Journal of information and Knowledge Management, 2*(4), 361-374.

Lancaster, H. M. (1999, March 31). A Major Force in Economic Development: A Challenge for the North Carolina Community College System. National Institute for Leadership & Institutional Effectiveness (NILIE) Conference keynote address, Asheville, NC.

Leidner, D. E., & Jarvenpaa, S. L. (1993). The Information Age Confronts Education: Case Studies on Electronic Classroom, *Commonwealth Higher Education Services.*

Lund, H. (1998). Joining Hands: A Survey of Non-Academic Collaboration Between Commonwealth Universities, *Commonwealth Higher Education Services.*

Marinho, H. E. G. (1992). *Language study and the Nigerian school curriculum.* Lagos, Federal Ministry of Education, ICNPE. (National School Curriculum Review conference proceedings.)

Marija, J. N. (1997). *SPSS 6.1 Guide to Data Analysis.* New Jersey: Prentice Hall.

Mercer, N., & Fisher, E. (1998). How Do Teachers Help Children to Learn: An Analysis of Teachers' Interventions in Computer-Based Activities. In D. Faulkner, K. Littleton & M. Woodhead, (Eds.), *Learning Relationships in the Classroom*. London & New York: Routledge & Open University Press.

Nworgu, B. G. (1991). *Educational Research: Basic Issues and Methodology*. Ibadan: Wisdom Publishers.

Ololube, N. P. (1997). *An appraisal of teachers' perception of academic and professional training on teachers' job effectiveness in secondary schools in Ndokwa East Local Government Area of Delta state of Nigeria*. Unpublished Masters' thesis, Delta State University Abraka, Nigeria.

Ololube, N. P. (2004, September 23-25). *Professionalism: An Institutional Approach to Teachers' Job Effectiveness in Nigerian Schools.* Paper Presented at the Seventh International LLinE Conference.

Ololube, N. P. (2005a). Benchmarking the Motivational Competencies of Academically Qualified Teachers and Professionally Qualified Teachers in Nigerian Secondary Schools. *The African Symposium, 5*(3), 17-37.

Ololube, N. P. (2005b). School Effectiveness and Quality Improvement: Quality Teaching in Nigerian Secondary Schools. *The African Symposium, 5*(4), 17-31.

Olugbemiro, J. (2000). TEACHERS -- Training of -- China -- Hong Kong; PERCEPTION -- Testing; EXPERTISE. *Educational Research, 42*(3), 287-318.

Pillai, R. (2001). *Teachers must engage is active capacity building*. UNESDOC: On-line UNESCO Documents .

Perry, P. (1994). Defining and Measuring the Quality of Teaching. In D. Green (Ed.), *What is Quality in Higher Education?* Bristol: SRHE & Open University Press.

Postholm, et al. (2002). *The Teacher's Role when Pupils Use ICT as a Mediating Artefact in Project Work.* Retrieved from http://www.psy.vu.nl/iscrat2002/postholm.pdf

Sala, N. (2004). Web Based Teaching and Learning: Two Swiss Example. *Proceedings of the 2004 IRMA International Conference*, USA.

Saunders, M., Lewis, P., & Thornhill, A. (2000). Research Methods for Business Studies, (2nd ed.). Harlow: Prentice Hall.

Sung, P. (2000). *The Theory and Practice of the Teaching-learning Method (I)*. Seoul: Education & Science Publishing Co.

Tharp, R., & Gallimore, R. (1998). A Theory of Teaching as Asisted Performance. In D. Faulkner, K. Littleton & M. Woodhead (Eds.), *Learning Relationships in the Classroom.* London & New York: Routledge & Open University Press.

Vygotsky, L. S. (1978). *Mind in Society. The Development of Higher Psychological Processes.* Cambridge: Harvard University Press.

Whitty, G. (1996). Professional Competences and Professional Characteristics: The Northern Ireland Approach to the Reform of Teacher Education. In D. Hustler & D. McIntyre (Eds.), *Developing Competent Teachers: Approaches to Professional Competence in Teacher Education*. London: David Fulton Publishers.

Wood, D. J., Bruner, J., & Ross, G. (1976). The Role of Tutoring in Problem Solving. *Journal of Child Psychology and Psychiatry, 17*(2), 89-100.

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