SKILLS AND PREPARATION IMPROVEMENT NEEDS OF PRE-SERVICE TECHNOLOGY EDUCATION TEACHERS IN THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN THE 21ST CENTURY

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Abstract

The study revealed the needed skills and preparedness of pre-service technology education teachers in the use of Information and Communication Technology (ICT) in the 21st Century. Three research questions were formulated for the study. The study adopted the descriptive survey design. It was carried out in two tertiary institutions in Niger State that offer technology education programme, the population for the study consisted of 322 students. 112, 500 level students of Industrial and Technology Education (ITE) Department and 210, NCE III students of School of Technical education (STE). A simple random sampling technique was used to sample 234 students, 80 from ITE Department and 154 students from STE. Validated questionnaire was used to elicit responses from the respondents. The data collected were analysed using mean. The findings of the study among others includes; ICT skills such creation of (images, text, graphic art, animation), use of scanner, digital camera, projectors are needed and pre-service technology education teachers were well prepared in the use of word Processing and Keyboard, fairly prepared in the use of spreadsheet/databases, while poorly prepared in creation of 3d designs of objects and uses of web 2.0 tools to enhance a presentation of wordle, picture cube and glogster. It is therefore recommended that; The pre-service technology education teachers should be taught how to create images, charts, text, graphic art using computer and use equipment such as projectors, digital camera, scanner and other for future application, Institutions administration should provide adequate hardware and software and other ICT facilities/equipment in order to facilitate teaching of application of ICT to education and internet connectivity should be made available in classrooms, offices, laboratories, workshops and hostels of tertiary institutions.

Introduction

Education is the most valuable treasure any nation can give to its citizens. Education should enable the learner to formulate a positive outlook towards life and to accept a stand which suits the well being of the society and the individual as well. The educational process expected in and outside our formal schools should concentrate upon inculcating concepts, abilities, attitudes and values in tune with these work culture (Saba, Ajayi, Owodunni and Adamu, 2014). It is believed that 'no nation can rise above the quality of its education system'. Based on this self evident truth, the national policy formulators recommended, as a priority, the training of those responsible for facilitating the education of Nigerians in the development

planning process. The development of any nation is critical to the technological and economic survival and vibrancy of that nation. This holds particularly true for developing nations like Nigeria, who is still grappling with chronic factors like unemployment and under employment which lead to economic frustration and poverty among significant percentage of the citizenry (Uwaifo, 2009). As Nigeria yearns for industrial and economic development, it is necessary of this country to imbibe on functional education which geared towards the acquisition of knowledge and information as well as relevant competencies (skills, attitudes and aptitudes). Function education should go beyond mere literacy but incorporate ability to "do" and "apply". Developed nations make concrete effort to develop their citizens with right type of education, which enable then use both their heads and hands. The type of education that equipped its recipients with such abilities is generally referred to as technical or technology education.

To achieve this it necessary for pre-service teachers should be well equipped with ICT skills for proper transmission of knowledge apart of technical knowledge acquired. 21st century education reform policy has been focused on a shift from the traditional teacher-centered pedagogy to more learner-centered methods. Active, collaborative learning environments facilitated by ICT contribute to the creation of a knowledge-based student population. This limits the role of the teacher to supporting, advising, and coaching students rather than merely transmitting knowledge. The integration of information and communication technologies (ICT) in the pre-service teaching and learning process is progressively being acknowledged as a vital and necessary step forward. To achieve this there is need for well prepared pre-service teacher. The importance of pre-service teachers for student learning is unquestionable, because better prepared teachers are more academically able and are rated as more effective by their directors, supervisors, and colleagues. As compare less well prepared teachers have more classroom difficulties and are rated less effective by evaluators and colleagues. Therefore, an education system that aims to offer a quality education for all its citizens should be able to rely on teachers who are well prepared, competent and committed ones (Koksal, 2013).

Literature Review

Technology Education can be described as a systematic way of exposing individual to the practical task for developing and producing goods and services to meet the needs and wants of man. It is basically an occupational education. It is the total experiences of the individual whereby he or she learns successfully to carry on a gainful occupation (Saba, Ibrahim & Kareem, 2011). The programmes are aimed at providing the technological literacy, knowledge, skills and attitudes necessary to become competent, contributing and productive members of society. It prepares citizens who are able to direct, control and manage their technological environments. They are also able to respond to the needs of business and industry for trained workers and managers. The appropriate ratio of engineers: technologist: technicians: craftsmen as reported Faluyi in (Ohize 2016) are 1:5:40:480 for the production of technician and craftsmen in this ratio who are competent for technological development, the nation must need pre-service technology education teachers who are very competent to transfer technology to learners.

Saba *et al.* (2011) reiterated that out of all the educational problems that beset the Nigeria and Africa continent today, none is as persistent or as compelling as the one relating to the training of competent teachers who is directly or indirectly bound to influence the quality and quantity of services provided by all skilled personnel, as poorly trained teachers tent to produce their own kind. According to Uwaifo (2009), education unlocks the door of modernization but it is the teacher who holds the key to the door. Momoh-olle (2005) lamented that if a teacher makes a mistake generations yet unborn may suffer the consequences because the mistakes of the teacher are more devastating to the future generation than the mistakes of the member of any other professions. He makes an instance, that an average teacher would affect directly or indirectly the lives of as many as 20,000 people before his retirement.

Information and Communication Technology (ICT) includes computers, the Internet, and electronic delivery systems such as radios, televisions, and projectors among others, and is widely used in today's education field (Castro-Sanchez & Aleman, 2011). The various kinds of ICT products available and having relevance to education, such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counselling, interactive voice response system, audiocassettes and CD (Bhattacharya & Shar 2007). Mikre (2015) said that, ICTs greatly enhance the acquisition and absorption of knowledge; it offers developing countries great opportunities to facilitate their educational systems. Mikre furthered refers to ICT as the used computer and internet connections to handle and communicate information for learning purpose, such as E-learning, blended learning, constructivist learning and others. ICTs are increasing impacts on pedagogical approaches in the classrooms. Their contribution to changes in teaching, innovation, and community services is considerable. Similarly, the use of ICTs in education also shifts the learning approaches.

Statement to the Problem

The production of quality skill manpower resulted from classroom as teachers formed a pivot in which the production of quality skill manpower can be realized. It is sad to note that the quality of technology education teachers produced from training programmes have failed short of expectation of producing VTE graduates with the right skills needed for technological and economic development of the nation (Saba *e tal.,* 2011). This is clearly seen from the output of the graduates. The paradigm shift from a lecturer-centred (traditional methods of teaching) to active learning/student-centred approaches, which can be achieved through effective use of ICT has been widely advocated throughout the world. (Saba *e tal.*, 2014).

The quality of teachers as a predictor of student learning is very significant, therefore the importance of teacher training is heightened- in this light what is the role of ICT as a tool facilitating teacher training (Smith & Kennedy, 2014). The effects of weaknesses on the part of education graduates teacher have serious negative implications on the cognitive performance, skills acquisition and affective skills of the students. If these problems are left unattended to, it will cause a serious drawback to national economic and technological advancement. For 21st century education, teaching professional development need not only technology skills and applications, but also in new pedagogical methods of incorporating technology into the classroom. Hence, the need to assess the needed skills and level of preparedness of pre-service technology education teachers in the use of ICT in the 21st century.

Aim and Objectives

The study assessed the needed skills and level of preparedness of pre-service technology education teachers in the use of ICT for 21st century education. Specifically the study determined:

1. ICT skills needed for competency in teaching technology education courses.
2. Level of pre-service technology education teachers' preparation in the use of ICT in teaching technology education courses.
3. Adequacy of ICT equipment and facilities for teaching technology education courses by pre-service technology education teachers.

Research Questions

1. What are the ICT skills needed for competency in teaching technology education courses?
2. How prepared are pre-service technology education teachers in the use of ICT in teaching technology education courses?
3. How adequate are ICT equipment and facilities for teaching technology education courses by pre-service technology education teachers?

Research Method

The study adopted descriptive survey research design, descriptive study aim at collecting data on, and describing in a systematic manner the characteristics, features or facts about a given population. The study was carried out in two institutions that trained technology education teachers in Niger State (Federal University of Technology Minna and College of Education Minna). The population for the study consisted of 322 students. 112, 500 level students of Industrial and Technology Education (ITE) Department and 210, NCE III students of School of Technical education (STE). Simple random sampling technique was used to sample 234 students, 80 from ITE Department and 154 students from STE. The instrument used for data collection was a structured questionnaire. SPSS version 19 was used to compute the mean and standard deviation of each item. The decisions for the research questions were based on the resulting means score interpreted relative to the concept of real lower and upper limits of numbers as shown in Table 1.

Table 1: Five Point Scale

S/N	Scale of R.Q 1	Scale of R.Q 2	Scale of R.Q 3	Point
1.	Very Highly Needed	Very Well Prepared	Very Highly Adequate	4.50 – 5.49
2.	Highly Needed	Well Prepared	Highly Adequate	3.50 – 4.49
3.	Fairly Needed	Fairly Prepared	Fairly Adequate	2.50 – 3.49
4.	Lowly Needed	Poorly Prepared	Poorly Adequate	1.50 – 2.49
5.	No Needed	Not Prepared	Inadequate	0.50 – 1.49

R.Q = Research Question

Research Question One

1. What are the ICT skills needed for competency in teaching technology education courses?

Table 2: The means respondent of ITE Students FUT Minna and STE Students of C.O.E Minna on ICT Skills Needed for Competency in Teaching Technology Education Courses.

	Skill;	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_{av}$	RMK
1	use of word Processing & Keyboard	4.44	4.78	4.61	Very Highly Needed
2	use of spreadsheet / databases	3.76	3.46	3.61	Highly Needed
3	use of a scanner	3.56	3.98	3.77	Highly Needed
4	use of a projector	4.02	3.79	3.91	Highly Needed
5	use of a digital video	4.08	4.78	4.43	Highly Needed
6	use of a flip cam	3.98	4.03	4.01	Highly Needed
7	to create polygons, tessellations and shape nets	3.45	4.11	3.78	Highly Needed
8	to create diagrams with labels	3.78	3.88	3.83	Highly Needed
9	use of a colour palette	3.46	3.76	3.61	Highly Needed
10	use of basic drawing tools	3.97	3.67	3.82	Highly Needed
11	to create free hand pictures using computer.	4.78	4.59	4.67	Very Highly Needed
12	use of a variety of tools including eraser, shape tools, paintbrush, and colour	4.11	4.34	4.23	Highly Needed
13	to insert Clip Art and images from files	4.39	4.23	4.31	Highly Needed
14	to create a basic webpage including text, graphic and links	4.65	4.35	4.50	Very Highly Needed
15	uses of web 2.0 tools to enhance a presentation,Wordle, picture cube, glogster	3.70	4.76	4.23	Highly Needed
16	to create 3d designs of objects	3.45	3.76	3.61	Highly Needed
17	to create templates in programmes such as Word and Excel	4.12	4.34	4.23	

					Highly Needed
18	to create a Photostory	3.47	3.86	3.67	Highly Needed
19	to download digital video and edit to make a movie	4.23	4.41	4.32	Highly Needed

Key: $\bar{X}_1$ = Mean responses of ITE Students; $\bar{X}_2$ = Mean responses of STE Students; $\bar{X}_{av}$ = Average Mean of respondents

The Table 2 shows that the skills in item 1, 11 and 14 were scored very highly needed with average mean ranging from 4.50 to 4.67, while others skills were rated as highly needed having mean scores ranging from 3.61 to 4.43.

Research Question Two

How prepared are pre-service technology education teachers in the use of ICT in teaching technology education courses?

Table 3: The means respondent of ITE Students FUT Minna and STE Students of C.O.E Minna on Level of Pre-service Technology Education Teachers Preparation in the Use of ICT in Teaching Technology Education Courses.

	Skill:	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_{av}$	**RMK**
1	use of word Processing & Keyboard	3.44	3.78	3.61	Well Prepared
2	use of spreadsheet / databases	2.82	2.57	2.70	Fairly Prepared
3	use of a scanner	2.34	2.11	2.23	Poorly Prepared
4	use of a projector	2.64	2.46	2.55	Fairly Prepared
5	use of a digital video	2.42	2.11	2.27	Poorly Prepared
6	use of a flip cam	2.01	2.17	2.09	Poorly Prepared
7	to create polygons, tessellations and shape nets	1.97	1.45	1.71	Poorly Prepared
8	to create diagrams with labels	1.99	1.46	1.73	Poorly Prepared
9	use of a colour palette	2.56	2.53	2.55	Fairly Prepared
10	use of basic drawing tools	2.33	2.02	2.18	Poorly Prepared
11	to create free hand pictures using computer.	2.17	2.24	2.21	Poorly Prepared
12	use of a variety of tools including eraser, shape tools, paintbrush, line thickness and colour	2.39	2.00	2.20	Poorly Prepared
13	to insert Clip Art and images from files	2.76	2.47	2.62	Fairly Prepared
14	to create a basic webpage including text, graphic and links	2.78	2.51	2.65	Fairly Prepared
15	uses of web 2.0 tools to enhance a presentation e.g Wordle, picture cube, glogster etc	2.39	2.23	2.31	Poorly Prepared
16	to create 3d designs of objects	1.79	1.50	1.65	Poorly Prepared
17	to create templates in programmes such as Word and Excel	1.73	1.69	1.71	Poorly Prepared
18	to create a Photostory	1.62	1.53	1.58	Poorly Prepared
19	to download digital video and edit to make a movie	2.46	2.31	2.39	Poorly Prepared

The Table 3 revealed the skills preparedness level of students. It shows that they were well prepared in item 1 with mean of 3.61, fairly prepared in items 2, 4, 9, 13 and 14 with mean

scores ranging from 2.55 to 2.75 while the other items revealed poorly prepared level having the mean scores ranging from 1.58 to 2.39.

Research Question Three

How adequate are ICT equipment and facilities for teaching technology education courses by pre-service technology education teachers?

Table 3: The Means Respondent of ITE Students FUT Minna and STE Students of C.O.E Minna on Adequacy ICT Equipment and Facilities for Teaching Technology Education Courses by Pre-Service Technology Education Teachers.

S/N		$\overline{X}_1$	$\overline{X}_2$	$\overline{X}_{av}$	RMK
1	Standby generator	3.55	3.13	3.34	Fairly Adequate
2	Internet connectivity	1.52	1.62	1.57	Poorly Adequate
3	Scanner	1.57	1.65	1.61	Poorly Adequate
4	Television	1.79	2.64	2.22	Poorly Adequate
5	Radio	1.54	1.98	1.76	Poorly Adequate
6	Computer	2.57	2.68	2.63	Fairly Adequate
7	Projector	2.87	2.67	2.77	Fairly Adequate
8	Digital video	1.66	1.57	1.62	Poorly Adequate
9	Flip cam	1.64	1.53	1.59	Poorly Adequate
10	Interactive white board	2.51	2.78	2.65	Fairly Adequate
11	Teaching laboratory	2.43	2.84	2.64	Fairly Adequate
12	Digital cameral	1.50	1.52	1.51	Poorly Adequate
13	Printer	2.32	2.09	2.21	Poorly Adequate

Table 4 shows that ICT equipment and facilities in item 1, 6, 7, 10 and 11 were fairly adequate with mean scores ranging from 2.63 – 3.34 while other items were poorly adequate having mean scores ranging from 1.51 – 2.22.

Findings of the Study

1. ICT skills such as use of word Processing & Keyboard to create free hand pictures using computer were very highly needed while skills like creation of images charts, graphic art, 3d designs of objects and uses of web 2.0 tools to enhance a presentation of wordle, picture cube and glogster were highly needed.
2. The pre-service teachers are well prepared in the use of word Processing and keyboard, fairly prepared in use of spreadsheet/databases, while poorly prepared in creation of 3d designs of objects and uses of web 2.0 tools to enhance a presentation of wordle, picture cube and glogster.
3. Standby generator, computer and projector were fairly adequate while internet connectivity, digital camera, scanner, were poorly adequate.

Discussion of Findings

The findings in Table 2 revealed the ICT skills that are very needed by pre-service technology education teachers to enable them function effectively in the 21st century. The skills such as use of word processing, creation of (images, graphic art, animation, text, sound, and chart), use of digital video, scanner, projectors and others were adjudged to very highly needed and highly needed respectively for competency in teaching technology education courses. These findings were in harmony with the study conducted by Hassan, Babawuro, Muhammad and Yahaya (2013) which they affirmed that Considering the challenges in TVE institutions;

there is need to realign curriculum offering to reflect the current labour markets demands in terms of ICT skills, to retrain staff with an up-to-date knowledge and ICT skills that is required to handle new equipment and new services in a knowledge-based society. Saba, Okwori, Ewuga, Mohammed and Chado (2015) supported the findings saying ICT skills such as creation of images, text, and charts are much needed in the development and use of multimedia instructional packages for teaching and learning technology education courses. This is also strengthen by Ogochukwu (2010) which emphasized that acquiring ICT skills are needed in the utilization of the computer packages for teaching.

On level of preparedness of pre-service technology education teachers in the use of ICT in teaching, the study revealed that they are well prepared in word processing, but fairly prepared in the use of spreadsheet/databases, use of projector and poorly prepared in creation of images, charts, graphic art and others. The findings were not surprising, it agree with the work of Eugene and Agah (2014), which showed that application of technology in many schools failed because the teachers were inadequately prepared to use the technology and lacked necessary and adequate support. Pre-service teacher trainers are yet to adequately integrate ICT tasks in the teaching and learning, which will thereafter help would be teachers. The findings also revealed that ICT equipment and facilities were fairly and poorly in supply. This is in agreement with the study carried out by Saba *e tal.* (2015) which revealed that to enhance the use of multimedia instructions in higher institutions, there is need for provision of adequate equipment/facilities for production and utilization of multimedia instructional package and provision of adequate internet connectivity to institution, as many of higher institution experience shortage of these equipment and facilities.

Conclusion

The findings revealed that ICT skills such as word processing, creation of (images, text, charts, and graphic art) and the use of scanner, projectors and others are very needed for effective teaching and learning of technology education. The skills should be acquired by teacher on training before graduation. The poor preparedness level of pre-service teachers has shown in the classroom as one cannot give what he or she doesn't have. The level of preparedness is as a result of poor ICT equipment and facilities in technology education teacher training institutions.

Recommendations

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

1. The pre-service technology education teachers should be taught how to create images, charts, text, graphic art using computer and they should also be taught how to use equipment such as projectors, digital camera, scanner and other for future application.
2. Institutions administration should provide adequate hardware and software and other ICT facilities/equipment in order to facilitate teaching orapplication of ICT to education.
3. Internet connectivity should be made available in classrooms, offices, laboratories, workshops and hostels of higher institutions to facilitate the acquisition of ICT skills for effective in teaching of technology education courses.
4. Adequate use of ICT can be made possible, when there is adequate power supply to the institutions. Therefore constant electric power supply should be made available in the institutions and this can be done through the availability of standby generator.

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