

Preparing Science Teacher Trainees for the Needs of Postmodern Society and Acquisition of 21st Century Teaching Skills

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ABSTRACT

This study investigated pre-service science teachers' training needs of postmodern society and acquisition of 21st century teaching skills in Akwa Ibom State University, Nigeria. The study was conducted in Akwa Ibom State University. The study adopted descriptive survey research design. The population of the study consisted of all 200 and 400 level students in the faculty of education in the study area. Purposive sampling technique was used for the study. The sample consisted of 165 pre-service teachers drawn from the faculty of education. The research instruments developed, validated and used for the study were questionnaire on pre-service teachers training needs of postmodern society, QPTTNPS ($\alpha = 0.78$) and questionnaire on teacher trainees acquisition of 21st teaching skills, QTTACS ($\alpha = 0.82$). The data collected were analyzed using percentage, frequency count, mean score to answer the research questions and independent t-test to test the hypotheses at 0.05 level of significance. The results obtained revealed that pre-service teachers' training needs of postmodern society including needs to acquire skills in the use of technology and digital resources was high. Male and female pre-service teachers did not differ in their training needs of postmodern society. The result also showed that pre-service teachers' level of acquisition of 21st century teaching skill was low. It is therefore recommended that the programme of training teachers should be reviewed to equip the trainees with relevant skills such as digital, ICT, 21st century teaching skills; training curriculum should prepare the trainees to meet the needs of postmodern society.

Keywords: Pre-Service Teachers, Postmodern Society, 21st Century Teaching Skills, Gender, Training Needs

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1. BACKGROUND TO THE STUDY

The curriculum for training teachers must consider training teachers in the use of Information and Communication Technology (ICT) tools and resources for successes in educating learners of 21st century. The conventional classrooms are day-in-day-out undergoing technological and digital transformations different from what was obtainable in the previous dispensations. Learners in the modern time are very versatile in the use of online and social media platforms to source for information related to their studies and social lives. As the society is becoming more complex in every area so also there is the need to prepare teachers to face the challenges of training the child that will be sent back to the complex society as an agent of change.

The world today is rapidly changing in such a way that the change has affected virtually every facet of life. An attempt to educate a child in line with the changing society means a lot to the parents, teachers, government and other concerned individuals. This implies that parents have the duty to provide their wards with functional education that will make them productive members of this present modern and future society. However, no functional education can be given to a child without the major contributions of a professionally trained teacher. The teacher is therefore faced with the challenges of educating the child in line with modern and post modern demands. The process of educating a child who will in turn be an agent of change in the society is a function of the type of training received by the teacher.

National Policy on Education (FME, 2013) recommended that teacher training should be qualitative, comprehensive, functional and relevant to the needs of the society. In addition to this, FME (2013) highlighted nature of the teacher training that will meet the needs of the society which are:-

- i. All teachers in educational institutions shall be professionally trained. Teacher education programs shall be structured to equip teachers for the effective performance of their duties; information technology (IT) training shall be incorporated to all teacher training programmes.
- ii. At the Nigeria Certificate in Education (NCE) and Degree levels, education programme shall be expanded to cater for the requirements of technical vocational, business and special education.
- iii. Teacher Education shall continue to take cognizance of changes in methodology and in the curriculum. Teachers shall be regularly exposed to innovation in the professions.
- iv. All newly recruited teachers shall undergo former process of induction and that in service shall be an integral part of continuing teacher education in line with this, the goals of teacher training shall be to (FME, 2013):
 - a. Produce highly motivated, conscientious and efficient classroom teachers for all levels of the educational system.
 - b. Further encourage the spirit of enquiry and creativity in teachers.
 - c. Help teachers fit in to the social life of the community and the society at large and enhance their commitment to national goals.
 - d. Provide teachers with the intellectual and professional background adequate for their assignment and to make them adaptable to changing situation.
 - e. Enhance teachers' commitment to the teaching professions.

In order for teachers to acquire professional background adequate for their assignment and to make them adaptable to changing situations, the curriculum for their training must reflect the process of acquiring skills in Information Technology (FME, 2013), the needs of the society and approaches to meet these diverse needs. However, Udo and Babayemi (2019) in their study on pedagogical and content knowledge training challenges of integrated science pre-service teachers reported that there were pedagogical and content knowledge training challenges faced by integrated science pre service teachers and the level of pedagogical and content knowledge training challenges was inadequate. These researchers recommended that the training curriculum should be practically based and reflect what the society needs for national development.

As societies grow from the state of simplicity to that of complexity propelled by modernization and technological advancement, so also does the teacher training needs become increasingly complex and modernized. The 21st Century with the emergence of breakthrough in communication technology, has ushered in certain changes and challenges in pre-service teacher's training need. Hence, 21st -century skills become an important element of teacher training. Meanwhile, in order to cope with and adapt to the modern trend, pre-service teacher's training must be reviewed and reorganized along modern technologies and teeming societies, if effective teacher's training needs should be achieved.

However, pre-service teacher's training programmes are also important to enhance effective teaching profession especially for those teachers who have passion for teaching profession but are not able to further it to the apex level (UNESCO, 2020). Pre-service teachers training programme are recognized and organized, private and public educational programme designed to train future teachers to formally enter the profession at a specified level of education. Graduates receive a government recognized teaching qualification.

Pre-service education of teacher means, education of teachers before they enter into classroom teaching as a teacher. During this period of teacher education programmes, teaching practice goes side by side, while they are getting knowledge about theory papers. A good deal of improvement in the teacher education programme is needed. Pre-service education is carried on for preparing different types of teachers. Research based curriculum development of pre-service teacher education is yet to take roots. These programmes are intended to support and enhance teacher learning, instill in them a greater degree of self confidence. The beginning teachers in this case learn from their practice and from the culture and norms of the unique school settings where in they have been placed and interact with these cultures.

It is important for teacher educators to learn the methodology of how to get in touch with the core qualities of a good teacher and how they can stimulate these qualities in student teachers. This will lead to a deeper involvement in the learning process of teacher educators as well as student teachers. The inclusion of appropriate content knowledge about essential qualities of a good teacher in relevant theory and practice of effective domain related traits in school situation for a longer duration could help promote these traits in student teachers.

The teacher education programme needs to allow the space where in a teacher's personality could be developed as someone who is reflective, introspective and capable of analyzing his or her own life and the process of education at school so that after becoming a teacher, he becomes an agent of change. The would-be teachers need to also acquire specific skills and training that will meet the needs of the changing world of works and learners' aspiration.

Meanwhile Broad (2018), asserts that quality teacher education starts with the initial teacher training course (Pre-service training). This stage is vitally important as it lays the foundations for motivation and ensures that new teachers are competent before entering the classroom. However, many countries, especially the developing ones, face ongoing challenges of achieving good quality pre-service teacher training to respond effectively to the constantly changing needs of the curriculum learners and school communities.

Nevertheless, strengthening pre-service teacher training is necessary as research shows that it is the most effective way to raise educational quality as it will have overall benefits across the whole education system (Broad, 2018). Against this background, this research work is to examine and assess pre-service teacher's training needs of post modern society and acquisition of 21st century teaching skills in Akwa Ibom State University.

1.1 Statement of the Problem

The 21st century with the emergence of breakthrough in technology, has ushered in certain changes and challenges in pre-service teachers training needs. The teacher training curriculum therefore will no longer be effective in achieving societal needs. Literature reviewed that there were pedagogical and content knowledge training challenges faced by Science Pre-service teachers and that the level of the training was inadequate. Scholars therefore recommended that the curriculum for training teachers should be reviewed and reorganized along modern technologies and teaching societies and that research should be conducted to find solution to their training needs.

Therefore, this study examined preparing science teacher trainees for the needs of postmodern society and acquisition of 21st century teaching skills in Akwa Ibom State University. The moderating influence of gender on training needs and acquisition of 21st century teaching skills was also determined.

1.2 Purpose of the Study:

The purpose of this study was to examine pre-service teachers' training needs of post modern society and acquisition of 21st century teaching skills in Akwa Ibom State University.

Meanwhile, specific objectives were to:

1. Examine pre-service teachers' training needs of post-modern society.
2. Compare the rating of male and female pre-service teachers of their training needs of post modern society.
3. Determine acquisition of 21st century teaching skills of pre-service teachers.

1.3 Research Questions:

The following research questions guided the process of the research:

1. What are pre-service teachers' training needs of post modern society?
2. How do male and female pre-service teachers differ in their ratings of training needs of post modern society?
3. What is the level of pre-service teachers' acquisition of 21st century teaching skill?
4. What difference exists between the ratings of male and female pre-service teachers' acquisition of 21st century teaching skills?

1.4 Hypotheses

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

1. There is no significant difference in the rating of training needs of post modern society by male and female pre-service teachers.
2. There is no significant difference in the ratings of acquisition of 21st century teaching skills by male and female pre-service teachers.

2. RESEARCH DESIGN & METHODOLOGY

The study employed survey research design. This is concerned with the mode of gathering raw fact or data for the study (Carmen, 2013). This research design has proven to be one of the most effective and quantitative method for collecting information and analysis of data.

2.1 Population of the Study

In this research, the population of study are the 200 and 400 level teacher trainees from the five programmes in the Departments of Science Education, Faculty of Education in Akwa Ibom State University. The Five programmes are: Education Mathematics, Education Chemistry, Education Biology, Education Integrated Science and Education Physics.

2.2 Sample and Sampling Procedures

In this study, stratified random sampling method was adopted. There are pre-service teachers across the five programmes in the Faculty of Education in Akwa Ibom State University. Meanwhile, they were selected strategically from the Department to form the sample size of the study. The percentage of the sample in relation to the population of study is 80% which is a good representation. Department of Science Education was stratified into 100 Level, 200 Level, 300 Level and 400 Level. 200 Level and 400 Level teacher trainees were purposively selected. This was because 100 Level trainees have not really been exposed to the professional training; 300 Level trainees were on teaching practice exercise. One hundred and sixty five (165) trainees were used as sample for the study.

2.3 Instrumentations

The researcher adopted the use of questionnaire and interview administration. The researcher used closed-ended or structured questionnaire form and as well as carefully thought-out interview questions to obtain opinion of the respondents. The closed-ended or structured questionnaire form is deliberately adopted to guard against out-of points opinion from the respondents. Two instruments used were Questionnaire on Pre-Service Teachers' Training Needs of Post-Modern Society (QPTTNPS) and Questionnaire on Teacher Trainees Acquisition of 21st Century Skill (QTTACS).

These questionnaires are made up of two sections; Section A and Section B. Section A contains demographic data of the respondents such as gender, area of specialization and level of study while section B contains the items or questions which require respondents' opinion on the subject matter under investigation. The respondents were expected to express their opinion by responding as "True of Me or Not True of Me".

2.4 Validation of the Instruments

The questionnaires were subjected to peer review from the Department of Science Education, Akwa Ibom State University who made some necessary corrections and as well approved it to be used for the study.

2.5 Reliability of the Instruments

The researchers adopted Cronbach Alpha reliability method to determine the reliability of the instruments. The copies of the instrument were administered in a university to 25 teacher trainees. Data collected were subjected to analysis using Cronbach alpha which yielded reliability indices of 0.78 and 0.82 for QPTTNPS and QTTACS respectively.

2.6 Procedure for Data Collection

The researchers administered the questionnaires to 200 and 400 Level students 15 minutes before the commencement of lectures on Faculty courses. The questionnaires were retrieved immediately after completion and forwarded for data analysis.

2.7 Method of Data Analysis

In order to analyze the data obtained, the researchers used mean score and standard deviation to answer the research questions and independent t-test to test the hypotheses at 0.05 level of significance.

3. RESULTS

Research Question 1: What are pre-service teachers' training needs of post modern society?

Table 1: Mean and Standard Deviation of pre-service teachers' training needs of post modern society

S/N	Statements	Mean	Std.D	Decision
1.	I need more training to be well-versed in the subjects I teach in order to be proficient/skilful at using different methods and, if necessary, changing my approaches to optimize learning.	1.93	.250	True of Me
2.	I need more training to acquire a rich repertoire of teaching strategies and ability to combine approaches.	1.63	.484	True of Me
3.	I need more training on the knowledge of how and when to use certain methods and strategies.	1.74	.440	True of Me
4.	I need more training to have a deep understanding of how learning happens.	1.39	.489	Not True of Me
5.	I need more training on how to pay attention to individual students' motivations, emotions and lives outside the classroom.	1.19	.392	Not True of Me
6.	I need more training on how to be able to work in highly collaborative ways with other teachers and members of non-teaching staff.	1.63	.484	True of Me
7.	I need more training on how to network with professional communities and different partnership arrangements.	1.67	.473	True of Me
8.	I need more training to acquire strong skills in technology and the use of technology as an effective teaching tool.	1.75	.433	True of Me
9.	I need more training to both optimize the use of digital resources in my teaching and use information-management systems to track student learning.	1.92	.280	True of Me
10	I need more training to develop the capacity to help design, lead, manage and plan learning environments in collaboration with others	1.70	.458	True of Me
11	I need more training to reflect on my practices in order to learn from my experience.	1.84	.365	True of Me
Weighted Mean=1.67				

Table 1 shows the weighted mean score of 1.67 out of the maximum 2, which is higher than the standard mean of 1.50. This implies that pre-service teachers' training needs of post modern society was high.

Research Question 2: How do male and female pre-service teachers differ in their ratings of training needs of post modern society?

Table 2: Independent T-Test of Pre-Service Teachers' Training Needs of Post Modern Society by Gender

Gender	Mean	Std. D	N	Df	t
Male	18.75	2.09	65	163	1.725
Female	18.15	2.26	100		

Table 2 revealed that male pre-service teachers had higher training needs of post modern society mean score (\bar{x} =18.75) than their female pre-service teachers (\bar{x} =18.15). This difference (\bar{x} =0.60) was not statistically significant (see table 5). This means that male and female pre-service teachers did not differ in their training needs of post modern society. Both male and female pre-service teachers had similar training needs of post modern society.

Research Question 3: What is the level of pre-service teachers' acquisition of 21st century teaching skill?

Table 3: Mean and Standard Deviation of pre-service teachers acquisition of 21st century teaching skill

S/N	21st Century Teaching Skills	Mean	Std.D	Decision
A. Collaborative Skills				
1.	I can work together with other colleagues to solve problems	1.54	.894	True of Me
2.	I can work effectively and respectively in team to accomplish a common goal	1.58	.891	True of Me
3.	I can assume shared responsibility for completing a task	1.43	.892	Not True of Me
B. Communication Skills				
4.	I can structure data for used in product or oral presentation (e.g creating chats, tables or graphs)	1.43	.497	Not True of Me
5.	I can convey ideas using media other than a written paper (e.g. posters, videos).	1.42	.495	Not True of Me
6.	I can prepare and deliver an oral presentation to my colleagues and other professionals	1.49	.501	Not True of Me
7.	I can answer questions in front of audiences	1.59	.890	True of Me
C. Creating and Innovation Skills				
8.	I can use idea creations techniques such as brain storming or concept mapping	1.38	.487	Not True of Me
9.	I can generate my own ideas on how to confront a problem or questions	1.32	.468	Not True of Me
10.	I can test our different ideas or work to improve them.	1.47	.500	Not True of Me
11.	I can invent a solution to a complex, open ended questions or a problem.	1.15	.354	Not True of Me
12.	I can create an original product or performance to express any ideas.	1.42	.891	Not True of Me

D.	Self-Direction Skills			
13.	I can fake initiative when confronted with difficult problem of question	1.34	.880	Not True of Me
14.	I can plan the steps i will take to accomplish a complex task	1.60	.889	True of Me
15.	I can monitor my own progress towards complication of a complex task and modify my work accordingly .	1.50	.502	True of Me
16.	I can use specific criteria to access the quality of my work before it is complicated.	1.42	.495	Not True of Me
17.	I can study information about other countries or culture	1.52	.501	True of Me
18.	I can use information or ideas that comes from people and other countries or cultures.	1.44	.893	Not True of Me
19.	I can discuss issues related to Global Interdependency, (e.g. Global environmental trends etc.)	1.45	.499	Not True of Me
20.	I can understand the life experiences of people in cultures besides my own.	1.41	.494	Not True of Me
	Weighted Mean=1.45			

Table 3 shows the weighted mean score of 1.45 out of the maximum 2, which is lower than the standard mean of 1.50. This implies that pre-service teachers' level of acquisition of 21st century teaching skill was low.

Research Question 4: what difference exists between the ratings of male and female pre-service teachers' acquisition of 21st century teaching skills?

Table 4: Independent T-Test Analysis of Pre-Service Teachers' acquisition of 21st Century Teaching Skills by Gender

Gender	Mean	Std. D	N	Df	t
Male	29.01	4.159	65	163	.267
Female	28.84	4.106	100		

Table 4 revealed that there was no difference between the ratings of male and female pre-service teachers' acquisition of 21st century teaching skills ($t=.267$). Male pre-service teachers had higher acquisition of 21st century teaching skills mean score ($\bar{x} =29.01$) than their female pre-service teachers ($\bar{x} =28.84$). This difference ($\bar{x} =0.17$) was not statistically significant (see table 6).

Hypothesis 1: There is no significant difference in the rating of training needs of post modern society by male and female pre-service teachers

Table 5: Independent T-Test of Pre-Service Teachers' Training Needs of Post Modern Society by Gender

Gender	Mean	Std. D	N	Df	t	P-value
Male	18.75	2.09	65	163	1.725	.086
Female	18.15	2.26	100			

Table 5 revealed that there was no significant difference in the rating of training needs of postmodern society by male and female pre-service teachers ($t=1.725$; $df=163$; $P>.05$). Hence, hypothesis 1 was not rejected.

Hypothesis 2: There is no significant difference in the ratings of acquisition of 21st century teaching skills by male and female pre-service teachers.

Table 6: Independent T-Test Analysis of Pre-Service Teachers' acquisition of 21st Century Teaching Skills by Gender

Gender	Mean	Std. D	N	Df	t	P-value
Male	29.01	4.159	65	163	.267	.790
Female	28.84	4.106	100			

Table 6 revealed that there was no significant difference in the ratings of acquisition of 21st century teaching skills by male and female pre-service teachers ($t=.267$; $df=163$; $P>.05$). Hence, hypothesis 2 was not rejected.

4. DISCUSSION OF FINDINGS

The result in table 1 shows that pre-service teachers training needs of post modern society was high. This was in line with Kim, Raza and Seidman (2019) who conducted a research on improving 21st-century teaching skills: the key to effective 21st-century learners. The study observed that a key challenge in bringing about desired improvements lies in the lack of context-specific understanding of teaching practices and meaningful ways of supporting teacher professional development.

According to Ryan and Grieshaber (2005) in a paper, that teachers also need to have the analytical tools offered by a post modern perspective if they are able to recognize and address the ways in which the knowledge they use and the actions they take in the classroom can also marginalize and limit children's learning.

The result in table 3 reveals that the level of pre-service teacher acquisition of 21st century teaching skills was low. This result was in line with Tican and Deniz (2019) who conducted a research on pre-service teachers' opinions about the use of 21st century learning and 21st century teacher skills and found out that pre-service teachers' were not able to make enough use of learner and teacher skills during their practicum teaching at schools. Also, this result was negated by some scholars who conducted a study on pre-service teachers 21st century skills like Ball, Joyce and Anderson-Butcher (2016) who reported that student reported moderately high perceptions of their 21st century skills in all area.

According to Ozturk (2023) who also conducted a research on 21st century skill and reported that teachers were at high level. Teachers may very well adopt new ideas but out of habit continue practice as usual. Moreover, some elements of teacher knowledge and practice are more difficult to change. Specific routines that do not require new knowledge are less demanding than more complicated practices like involving students in reflection and discussion in line with 21st century skill (Desimone & Garet, 2015).

Result in table 2 shows that male and female pre-service teachers did not differ in their ratings of training needs of post-modern society. Also in table 5, the result reveals that there was no significant difference in the ratings of training needs of post-modern society of male and female pre-service teachers. According to Tilsen and Nylund (2010), teachers can help students to disturb the status Quo, however by encouraging them to take up multiple perspectives and become agents of social changes. In this way, post modernism can be seen as a resource which encourages knowledge and knowledge making.

Tilsen and Nylund (2010) do not view lack of classroom consensus or student unwillingness to adopt post modern positions as a failure of their students or themselves, rather, they view these moments as productive spaces that allow for difference and dialogue.

Result in table 4 reveals that there was no difference in the rating of male and female pre-service teacher acquisition of 21st century teaching skills. Also in table 6, the result shows that there was no significant difference in the rating of acquisition of 21st century teaching skills by male and female pre-service teachers.

This was not in line with Goksun and Kurt (2017) who reported that pre-service teachers' use of 21st century learner skills and its sub dimensions (cognitive autonomous, collaboration and flexibility and innovativeness skills) and 21st century teacher skills and its sub dimensions (administrative, teaching pedagogical, affirmative, flexible leaching and generative skills) were above mid level.

This was in line with Babayemi, Utibe and Babalola (2018) who reported that there was no significant difference between male and female science teachers' teaching skills. Uche, Kaegon and Okata (2016) reported that the teachers' level of awareness of 21st century occupational roles is just moderate and not very encouraging, teachers do not use technology in classroom instruction and the 21st century environment has affected the area of instructional materials, teaching strategies and others.

4.1 Educational Implications of the Study

1. Preparing today's pre-service teachers for the future simply means helping them to acquire the necessary skill and competencies that will enable them to be an effective teachers tomorrow.
2. There is a need for the teacher educators to reconsider using ICT and digital tools to teach and train the pre-service teachers, the type of education the teacher educator gives out to the pre-service teachers and skills the teacher educators often tend to emphasize.

5. CONCLUSION

This study examined preparing science teacher trainees for the needs of postmodern society and acquisition of 21st century teaching skills in Akwa Ibom State University, Nigeria. The results from this study showed that pre-service science teachers training needs of post modern society was high. Male and female pre-services teachers did not differ in their ratings of training needs of post modern society. The level of pre-service teachers' acquisition of 21st century teaching skills was low. There was no difference in the ratings of male and female pre-service teachers' acquisition of 21st century skills.

There was no significant difference in the ratings of training needs of post modern society or male and female pre-service teachers. The use of ICT and digital tools globally in education and with respect to the demands of global market is a signal to teacher training institutions to see the need to equip the teacher trainees with technological and digital skills, relevant knowledge and competencies that will meet up with modern and post modern challenges.

6. RECOMMENDATIONS

1. The education stakeholders in Nigerian should rise up to create an enabling environment that will improve the quality of teacher education programme so that the upcoming teachers would be able to face the challenges of 21st century classroom.
2. Government and philanthropists should see it as a matter of urgency and priority to ensure provision and donations of ICT and digital tools to teacher training institutions in Nigeria.
3. Government should set apart special budget for capacity building through teacher education and re-training of teacher educators.
4. Attending one or two conferences/seminars/workshop should be made compulsory for pre-service teachers as part of the requirements for graduation. This move will help them acquire up-to-date knowledge and skills that will help them fit for teaching, become productive and proficient users of technology.

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