

Teaching Skills Required by Pre-Service Teachers for Enhancing Teaching and Learning of Basic Science and Technology in Bosso Local Government, Niger State

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Abstract: The study was carried out to determine teaching skills required by pre-service teachers to enhance teaching and learning of basic technology in Bosso local government Minna, Niger state. Two research questions guided the study while two null hypotheses were formulated and tested at 0.05 level of significance. The study adopted survey research design. The population for the study was 40 pre-service teachers of basic science and technology. There was no sampling because of the manageable size of the population. The instrument used for data collection was structured questionnaire. Three experts validated the instrument. Mean and standard deviation were employed to analyze data for answering research questions while t-test was used to test the null hypotheses at 0.05 level of significance. The finding of the study revealed that Selection instructional content of a lesson, Select available human and material resources need for planning a lesson, Construct a lesson plan, Select methods and techniques for teaching a lesson, are the Instructional planning skills required by technology education student to enhance teaching and learning of Basic Science and Technology subject. Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order, Arrange benches and machines properly to facilitate learning are the Teaching methodological skills required by pre-service teachers for enhancing the implementations of Basic Science and Technology subject. Evaluating students affective domain, Assessing students psychomotor performance, Construct reliable test to evaluate students progress, Assessing the effectiveness of the teaching strategy, Making record about students academic ability, Provide records about students moral character and personality are the Instructional evaluation skills required by pre-service teachers for enhancing the implementations of Basic Science and Technology subject. It was recommended that pre-service teachers of basic science and technology should be retrained based on areas of needs identified in the study and relevant facilities for effective implementation of the Basic Science and Technology should be provided by government and other enabling bodies among others.

Keywords: Teaching skills, pre-service, teachers, basic science and technology

I. INTRODUCTION

The most important role of teacher education institutions in the educational system is to prepare pre-service teachers to be equipped with certain teaching skills. Teacher quality is a complicated concept, although qualities of teachers are categorized in various ways in the literature. It is critical to note that these qualities should be regarded as a whole, with each having complementary features. To enable pre-service teachers, acquire certain teaching skills, well-planned educational programs and well-trained teachers are needed to implement these programs. While philosophies, approaches, and practices adopted in education tend to change the role of the teacher, they have never undermined it. Indeed, teacher education institution hold a major responsibility in training qualified pre-service teachers as it is essential for the welfare of a country and securing the quality of all educational levels from primary to tertiary education.

Teachers who are deemed as professionally competent must demonstrate that they can teach successfully: can do effective planning, monitoring and evaluation for learning and manage the teaching curriculums according to the needs of individuals and groups within the classroom (Iris, 2020). The necessity of a teacher's expertise in their field and having the professional teaching knowledge that will enable them to pass on their knowledge and skills to students is believed to hold importance as to ensure quality in education. The teachers' sense of competence is said to be very important in the success of learning and teaching activities and in the motivation of students to learn (Iris, 2020). It is stated that the quality of teacher training has a direct influence not only on the development of children's knowledge, but also in the shaping of their personalities, especially during the early years of their education (European Parliament, 2008).

According to Salandanan (2012), teaching is a multifarious human activity. As an activity, it encompasses various aspects, including planning, strategies, organizational

structure, and material resources which simultaneously occur during the process of teaching and learning. Teaching is perceived as stimulating, directing, guiding the learner, and evaluating the learning outcomes of teaching. Contemporary teacher's role in teaching has become more complex but it has given the learner the responsibility of learning (Bilbao *et al.*, 2012). Bilbao *et al.* (2012) added that teaching requires from practitioners to understand what must be carried out to affect student learning and be well-equipped with the skills needed to perform various tasks.

In this context, teaching internship is an essential component of teacher training. It is actually the culminating experience that broadens and enhances the capability of the pre-service teachers who must cope with the multi-faceted responsibilities of teaching (Zeichner, 2014). In other words, it serves as the training of students in real world scenario, as they put into practice the educational theories and philosophies, teaching approaches and strategies and instructional technologies that they significantly learned in their professional education learning areas. In view of that, a quality teacher training could be evident through the lens of the teaching skills and performance of the pre-service teachers in teaching basic science and technology.

A sound knowledge of Basic Science and Technology subject in junior secondary schools can create a strong foundation for any technological development. It enables individual with knowledge and skills for designing techniques and process that will enable them to make maximum use of their natural resources for the benefit of the society and improving individual living. Basic Science and Technology is one of the pre-vocational subjects offered at the junior secondary schools in Nigeria. It is a preparatory core subject of vocational and technical education. Basic Science and Technology being one of the skill oriented subjects which enables the individual to acquire appropriate skills and abilities to live in and contribute effectively to the development of his society (Olaitan, 2013).

Basic Science and Technology is also a basic subject on which future technological development of students are built for those interested in vocational technical courses or engineering in higher institutions. According to the report of Federal Ministry of Education (FME) (2010), Basic Science and Technology is an essential subject in the 9 year basic education programme. Its purpose according to the report is to contribute to the achievement of the national education goals by inculcation of technology literacy, experience of students to the world of work to match their talents and interests for wise vocational choice and inculcation of positive attitudes towards work as a source of human identity, livelihood and power.

Reports from different states in Nigeria indicated poor performance of students in their Junior Secondary School Examination in Basic Science and Technology Babalola (2012). This could be attributed to incompetence of teachers of Basic Science and Technology in equipping the students

with knowledge, skills and attitudes that could assist them in passing their examinations. In addition, the inadequacy of required facilities in the schools also contributed to the weak implementation of Basic Science and Technology in schools. For every graduating students of technology education who are going to the field of equipping the teaching they must possess adequate and qualified teaching skills which will enable them to build student in the junior secondary schools. NERDC report (2012) stated that 50% of the teachers in Nigerian school system were found unqualified to teach.

Statement of the Problem

Basic Science and Technology is an incorporated subject whose teaching requires an interdisciplinary approach to the exclusion of subject's boundaries. Teacher quality is a strong predictor of student quality. More so, that it is widely acknowledged that no educational system can rise above the quality of its teachers". There is therefore great doubt as to the adequacy of teachers, in terms of quality teaching skills, now handling the subject in our various secondary schools.

Reports from different states in Nigeria indicated poor performance of students in their Junior Secondary School Examination in Basic Science and Technology Babalola (2012). This could probably be attributed to incompetence of teachers of Basic Science and Technology. The committees, (FGN, 2013) then observed that the present crops of teachers teaching the subject are grossly incompetent and incapable. Some recent studies carried out in the area of teacher quality for the junior secondary school Basic Science and Technology in some states of the federation indicate negative disposition (Nduanya, 2010) and Okeke (2014). In a similar survey, Aina (2014) on technical teacher production noted that out of all the militating factors against the full implementation of the Basic Science and Technology programme, the teacher quality factor ranks highest. As a result of the problem of inadequate teaching skill of the teachers of Basic Science and Technology. This study, therefore intend to identify teaching skills required by pre-service teachers for enhancing teaching and learning of Basic Science and Technology in Minna, Niger State.

Purpose of the Study

1. Instructional planning skills required by pre-service teachers to enhance the teaching and learning of Basic Science and Technology.
2. Classroom management/laboratory skills required by pre-service teachers to enhance the teaching and learning of Basic Science and Technology.

Research Questions

1. What are the Instructional planning skills required by pre-service teachers to enhance teaching and learning of Basic Science and Technology?
2. What are the Classroom/laboratory management skills required by pre-service teachers to enhance

teaching and learning of Basic Science and Technology?

Hypotheses

The following null hypotheses that will be tested at 0.05 level of significance:

H₀₁: There is no significant difference in the mean responses of pre-service teachers on the instructional planning skills required to enhance teaching and learning of Basic Science and Technology.

H₀₂: There is no significant difference in the mean responses of pre-service teachers on the classroom/laboratory management skills required to enhance teaching and learning of Basic Science and Technology.

II. METHODOLOGY

The study adopted a descriptive survey research design. The study was carried out in Niger State. The targeted population for the study is six (6) public schools which consist of 40 pre-service teachers. Since the population is of manageable size, there was no sample, the entire population was used for the study. The research instrument that was used for the study was a questionnaire. The instrument face validation by three lecturers in the Department of Industrial and Technology Education, Federal University of Technology, Minna. A trial test of the instrument was carried out for the purpose of determining the coefficient of stability of the instrument using test retest reliability technique. The instrument was administered on five Basic Science and Technology Students in Government Secondary School, Bida which is out of the research area. The reliability coefficient of the instrument was determined using Pearson product moment correlating coefficient. Reliability coefficient of 0.71 was gotten showing that the instrument was stable. The instrument that was used for the data collection was administered to the respondents by the researcher in the study area. Mean and standard deviation was used to analyze the data collected for the study, while t-test statistics was used to test the null hypotheses formulated for the study.

III. RESULTS

Research Question One

What are the Instructional planning skills required by pre-service teachers to enhance teaching and learning of Basic Science and Technology?

Table 1: Mean response of pre-service teachers on the instructional planning skills required to enhance teaching and learning of Basic Science and Technology.

S/No	ITEMS	\bar{X}	SD	Remarks
1	Select instructional content of a lesson	4.19	0.610	AGREED
2	Select available human and material resources need for planning a lesson	4.29	0.684	AGREED

3	Construct a lesson plan	4.21	0.652	AGREED
4	Select methods and techniques for teaching a lesson	4.31	0.639	AGREED
5	Select evaluation techniques	4.36	0.525	AGREED
6	Think of how lesson can be introduced to motivate students interest and participation	4.30	0.637	AGREED
7	Provide a conducive classroom environment for effective theoretical and practical work	4.23	0.701	AGREED
8	Create the objectives of a lesson to be achieved	4.25	0.674	AGREED
9	State the previous knowledge	4.28	0.620	AGREED
10	Topic selection	4.38	0.841	AGREED
11	Think appropriate timing to implement Basic Technology	4.26	0.916	AGREED
12	Thinking of instructional method	4.30	0.536	AGREED
13	Choice of instructional material	4.33	0.493	AGREED
14	Objective to be achieved	4.41	0.485	AGREED

Key: X= mean, SD= standard deviation

Table 1 shows the Mean response of pre-service teachers on the instructional planning skills required to enhance teaching and learning of Basic Science and Technology. The mean ranges from 4.19 - 4.41 indicating a high degree of acceptance showing objective to be achieved is an essential required skill and was ranked the higher having the mean score of 4.41. The standard deviation on each items ranges from 0.485 to 0.916 showing the closeness in the responses of the respondents. The table shows that all the respondents agreed to all the items.

Research Question 2

What are the Classroom/laboratory management skills required by pre-service teachers to enhance teaching and learning of Basic Science and Technology?

Table 2: Mean response of pre-service teachers on the classroom/laboratory management skills required to enhance teaching and learning of Basic Science and Technology.

S/No	ITEMS	\bar{X}	SD	Remarks
1	Reorganize the need for adequate ventilation in the classroom.	4.48	0.500	AGREED
2	Make the tools and equipment in good condition	4.39	0.552	AGREED
3	Arrange facilities in order of the needs for instruction	4.33	0.700	AGREED
4	Arrange classroom setting to accommodate various instructional activities	4.40	0.492	AGREED
5	Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order	4.36	0.615	AGREED
6	Arrange benches and machines properly to facilitate learning	4.39	0.567	AGREED
7	Supervise students activities in classroom/ laboratory	4.30	0.640	AGREED
8	Apply corrective measures to enhance discipline in the classroom / laboratory	4.34	0.542	AGREED

9	Organize routine cleaning procedure for the laboratory facilities	4.36	0.657	AGREED
10	Assign leaders among students to coordinate activities among themselves	4.30	0.642	AGREED
11	Check for the appropriateness of workshop facilities	4.31	0.464	AGREED
12	Assess the effectiveness of instruction in the workshop through students practical test	4.33	0.470	AGREED
13	Check laboratory tools and equipment after use	4.33	0.651	AGREED
14	The teacher should have full control on the class and students	4.34	0.540	AGREED
15	Maintaining order in the class	4.46	0.500	AGREED

Key: X= mean, SD= standard deviation

Table 2 shows the Mean response of pre-service teachers on the classroom management skills required to enhance teaching

Table 3: t- test Analysis of Mean response of pre-service teachers on the instructional planning skills required to enhance teaching and learning of Basic Science and Technology

S/N o	ITEMS	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	t-cal	Remark
1	Select instructional content of a lesson	4.47	0.501	4.45	0.499	0.823	NS
2	Select available human and material resources need for planning a lesson	4.33	0.599	4.29	0.606	0.528	NS
3	Construct a lesson plan	4.33	0.506	4.27	0.601	0.517	NS
4	Select methods and techniques for teaching a lesson	4.47	0.501	4.45	0.499	0.744	NS
5	Select evaluation techniques	4.22	0.610	4.17	0.601	0.563	NS
6	Think of how lesson can be introduced to motivate students interest and participation	4.31	0.617	4.28	0.696	0.736	NS
7	Provide a conducive classroom environment for effective theoretical and practical work	4.21	0.634	4.21	0.699	0.986	NS
8	Create the objectives of a lesson to be achieved	4.32	0.622	4.31	0.655	0.899	NS
9	State the previous knowledge	4.37	0.517	4.35	0.533	0.836	NS
10	Topic selection	4.32	0.612	4.29	0.651	0.765	NS
11	Think appropriate timing to implement Basic Technology	4.25	0.677	4.22	0.722	0.728	NS
12	Thinking of instructional method	4.24	0.624	4.25	0.675	0.968	NS
13	Choice of instructional material	4.36	0.612	4.37	0.861	0.896	NS
14	Objective to be achieved	4.28	0.820	4.25	0.801	0.834	NS

The data in table 3 shows the t-test analysis of the Mean response of pre-service teachers on the instructional planning skills required to enhance teaching and learning of Basic Science and Technology it can be seen that the calculated t-value (t-cal) of all the 14 items were less than the t-table value of 1.96 at 0.05 level of significance and 62 degree of freedom. This means that the opinion of the Lecturers and Basic Science and Technology teachers did not differ significantly on all the items. On this basis the null hypothesis is upheld for

and learning of Basic Science and Technology. The mean ranges from 4.30 - 4.48 indicating a high degree of acceptance showing reorganize the need for adequate ventilation in the classroom is an essential required skill and was ranked the higher having the mean score of 4.48. The standard deviation on each items ranges from 0.464 to 0.700 showing the closeness in the responses of the respondents. The table shows that all the respondents agreed to all the items.

Hypothesis One

There is no significant difference in the mean responses of pre-service teachers on the instructional planning skills required to enhance teaching and learning of Basic Science and Technology.

all the items. It can therefore be stated that there is no significant difference in the mean responses of lecturers and Basic Science and Technology teachers.

Hypothesis Two

There is no significant difference in the mean responses of pre-service teachers on the classroom/laboratory management skills required to enhance teaching and learning of Basic Science and Technology

Table 4: t- test Analysis of Mean response of pre-service teachers on the classroom/laboratory management skills required to enhance teaching and learning of Basic Science and Technology

S/No	ITEMS	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	t-cal	Remark
1	Reorganize the need for adequate ventilation in the classroom.	4.48	0.501	4.48	0.501	0.935	NS
2	Make the tools and equipment in good condition	4.38	0.551	4.35	0.554	0.787	NS
3	Arrange facilities in order of the needs for instruction	4.31	0.696	4.42	0.705	0.655	NS
4	Arrange classroom setting to accommodate various instructional activities	4.38	0.488	4.36	0.495	0.543	NS
5	Provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order	4.35	0.603	4.39	0.627	0.895	NS
6	Arrange benches and machines properly to facilitate learning	4.40	0.556	4.30	0.577	0.848	NS
7	Supervise students activities in classroom/ laboratory	4.29	0.640	4.35	0.642	0.916	NS
8	Apply corrective measures to enhance discipline in the classroom / laboratory	4.34	0.542	4.36	0.543	0.940	NS
9	Organize routine cleaning procedure for the laboratory facilities	4.36	0.658	4.30	0.658	0.984	NS
10	Assign leaders among students to coordinate activities among themselves	4.30	0.643	4.31	0.642	1.000	NS
11	Check for the appropriateness of workshop facilities	4.32	0.467	4.32	0.463	0.861	NS
12	Assess the effectiveness of instruction in the workshop through students practical test	4.33	0.473	4.33	0.468	0.817	NS
13	Check laboratory tools and equipment after use	4.33	0.653	4.33	0.652	1.000	NS
14	The teacher should have full control on the class and students	4.34	0.542	4.74	0.539	0.900	NS
15	Maintaining order in the class	4.46	0.500	4.61	0.501	0.892	NS

Table 4 shows the t-test analysis of the Mean response of pre-service teachers on the classroom management skills required to enhance teaching and learning of Basic Science and Technology subject it can be seen that the calculated t-value (t-cal) of all the 14 items were less than the t-table value of 1.96 at 0.05 level of significance and 62 degree of freedom. This means that the opinion of the Lecturers and Basic Science and Technology teachers did not differ significantly on all the items. On this basis the null hypothesis is upheld for all the items. It can therefore be stated that there is no significant difference in the mean responses of lecturers and Basic Science and Technology teachers

IV. DISCUSSION OF THE FINDINGS

The instructional planning skills required by pre-service teachers to enhance teaching and learning of Basic Science and technology revealed in table 1 shows that the respondents agreed on all the items which means that the findings in tables 1 are required skill by pre-service teachers on instructional planning which are select instructional content of a lesson, select available human and material resources need for planning a lesson, construct a lesson plan, select methods and techniques for teaching a lesson, select evaluation techniques, think of how lesson can be introduced to motivate students interest and participation, provide a conducive classroom environment for effective theoretical and practical work, create the objectives of a lesson to be achieved, state the previous knowledge, topic selection, think appropriate timing to implement basic technology, thinking of instructional

method, choice of instructional material, objective to be achieved. For proper implementation of basic science and pre-service teachers required the adequate teaching skills. Instructional planning should be properly prepared for the teaching and learning in classroom.

The findings is accordance with Gedzune (2015) that there should be proper instructional planning by the teacher before going to class to implement the teaching, it was also recommended that adequate instructional materials should be provided for the teaching of basic technology in junior secondary schools.

The result in table 2 show the findings on Classroom/laboratory management skills required by pre-service teachers to enhance teaching and learning of Basic Science and Technology from the table 2 it was clearly show that the respondents agree on all the items which means that for classroom management the state skills are required by pre-service teachers. The following are teaching skills require for implementation of basic science and technology: reorganize the need for adequate ventilation in the classroom make the tools and equipment in good condition, arrange facilities in order of the needs for instruction, and arrange classroom setting to accommodate various instructional activities, provide safety poster in the laboratory to encourage correct safety habit in sequence and logical order, arrange benches and machines properly to facilitate learning, supervise students activities in classroom/ laboratory, apply corrective measures to enhance discipline in the classroom / laboratory,

organize routine cleaning procedure for the laboratory facilities, assign leaders among students to coordinate activities among themselves, check for the appropriateness of workshop facilities, assess the effectiveness of instruction in the workshop through students practical test, check laboratory tools and equipment after use, the teacher should have full control on the class and students, maintaining order in the class. Class room should be properly manage to enhance effective teaching and learning so achieve the objective of the lesson.

The findings is in line with Gedzune (2015) that classroom/laboratory management should be properly equipped and arranged by the teacher in order to facilitated teaching and learning. Gedzune (2015) also recommended that well-equipped laboratories and technology workshop should be provided for practical work.

V. CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

It is clearly shown that Basic Science and Technologies an incorporated subject whose teaching requires an interdisciplinary approach to the exclusion of subject's boundaries. Teacher quality is a strong predictor of student quality. More so, that it is widely acknowledged that no educational system can rise above the quality of its teachers". There is therefore great doubt as to the adequacy of teachers, in terms of quality teaching skills, now handling the subject in our various secondary schools. therefore there is need to identify teaching skills required by the pre-service teachers to enhance teaching and learning of Basic Science and Technology in Niger State.

VI. RECOMMENDATIONS

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

1. Pre-service teachers of basic science and technology should be retrained based on areas of needs identified in the study.
2. Relevant facilities for effective implementation of the Basic Science and Technology should be provided by government and other enabling bodies.

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