



A survey of science teachers' attitude towards improvisation and utilization of improvised materials in Jos south local government area of Plateau state, Nigeria

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Abstract

The study was undertaken in order to survey the attitude of science teachers from Jos South Local Government Area of Plateau state towards improvisation and the use of improvised materials. A descriptive survey design was used for the study. The research instrument consisted of four-point Likert scale with 10 qualitative items that were developed from and linked to the reviewed literature. The four-point Likert scale had the following as key: SA = strongly agree, A = Agree, D = Disagree, SD = Strongly disagree. A total of 120 science teachers (chemistry, physics, basic science and biology teachers) were randomly selected from 30 schools and administered the Likert scale. The data collected was analyzed using frequency counts and percentages. The results generally show that the science teachers' attitude towards improvisation and the use of improvised teaching materials was not good. Even though they make use of improvised materials, they are not favorably disposed towards the production of improvised materials due to various reasons all which revealed that the teachers have poor attitude towards improvisation and the utilization of improvised materials. Based on the findings, the study recommended that the State Ministry of Education organizes workshops for teachers on improvisation during which they will be taught how to improvise simple instructional materials. The teachers should be encouraged to produce and use improvised materials made from local raw materials obtainable in their environments to reduce cost. They should engage their students in sourcing for the raw materials from the local environment in order to arouse their interest in the subject. There is the need for the development of positive attitudes by teachers towards improvisation and the use of improvised materials for their students. Finally, government should make educational technology a compulsory course in teachers' training institutions at all levels.

Keywords: Improvisation, improvised materials, attitude, science

Introduction

Education is one of the factors that most influence the advancement and progress of people and societies. It is the most powerful transformation tool that exists. It plays its role in the development, competitiveness, and improvement of the quality of life. Education enriches culture, spirit, values, and everything that characterizes us as human beings. The 21st-century education focuses on personalization, equality, collaboration, communication, and community relationships. These skills are necessary for a rapidly changing global economy. The purpose of education in today's society is to prepare students for the challenges of life in the career world (Robinson & Robinson, 2022) [15]. Because of the many different paths to success that exist today, different students need different outcomes from their experiences in the educational system. Rather than inculcating a set list of competencies or ideas, education must prepare students to think critically and select the opportunities that they need in order to succeed in their chosen paths.

Teachers play a key role in the education of students. The most effective teaching is that which results in the most effective learning – that in which the learning objectives are achieved by the learners. In order to achieve this, the teacher must have a clear idea of what learning is to be nurtured, and he sets up and provides a learning experience that enables this to happen (Ali, Mondal & Das, 2018) [2]. An effective teacher has a wide-ranging repertoire of different teaching and learning models, strategies and techniques and knows how to create the right conditions for learning. The choice is determined by the nature of the learning objective.

Effective teaching necessitates making difficult and principled choices, exercising careful judgment, and honoring the complex nature of the educational mission. In addition to the technical knowledge and skills teachers have to use in their daily practice, they must also select instructional materials that will help the students to learn. One of the most important tasks of teachers is to arrange and present in such a manner that they would have meaning to the learner both presently and in the future. The use of instructional materials helps a teacher to do this.

Adalikwu and Iorkpilgh (2013) [1] looked at instructional materials as those materials that are designed for use by students and their teachers as a learning resource to help students acquire facts, skills or opinions or develop cognitive process and understanding. They are essential supplements to teaching which represent a body of needed teaching and learning information, and that these materials reduce the work load of the teacher in the classroom. They are those materials designed and utilized during teaching/learning situations to clarify abstract words or concepts. Instructional materials are those materials and devices, real or representative, which the teacher uses to make the lessons more meaningful and to promote greater understanding of the learning experience (Tety, 2016) [13]. These materials are tools that educators use to facilitate student learning. They can be used in a variety of ways, depending on the instructional goals and objectives. There are different types of instructional materials. These include: Real materials include specimens, equipment and reagents, and objects; written and printed materials such as scientific and scholarly references, methodological guides, teacher's

sourcebooks, textbooks, journals, magazines, bulletins, laboratory manuals, encyclopedia, monographs, handouts, pupils' sourcebooks, workbooks, notebooks, etc; designed and technological materials such as equipment for transmission and assimilation of information recorded on film or on phonographic recordings (films, projectors, tape recorders, video, television sets, monitoring devices which can either be audio, visual, audio-visual), and computer facilities which can be used to plan, produce, implement and evaluate classroom instruction (Neji & Nuoha, 2015^[7]; Omiko, 2016)^[11].

The influence of instructional materials in promoting student's academic performance and teaching and learning in educational development is indisputable. Research findings have shown that students are stimulated more when taught with instructional materials. Neji and Nuoha (2015)^[7] reported that the availability, adequacy and utilization of laboratory facilities and students' academic performance in chemistry (for example) are significantly related. In the same vein, Instruction involving the use of audio-visual materials facilitates permanency of learning. The Nigeria National Council for Educational Technology has confirmed the results of past research that the use of computer by both staff and students increases student's performance. Wasagu (2011)^[18] observed that the factors responsible for students' general poor performance in science, technology and mathematics include laboratory facilities, inability of the teachers to put across ideas clearly to the students and inadequate number of learning facilities in schools as against consistent increase in the number of students. This is to say that instructional materials are very important in teaching learning process if learning out-come are to be achieved with relative ease. Advances in technology have brought instructional materials especially the projected and electronic materials to the forefront as the more radical tools of globalization and social development which have affected class teaching-learning situation positively. Adalikwu and Iorkpilgh (2013)^[1] in their study on the influence of instructional materials (teaching aids) on students' academic performance of senior secondary schools in Chemistry, found that students taught with instructional materials perform better and higher than those taught without instructional materials. There was a statistical relationship between the academic performance of chemistry students and the use of instructional materials in teaching and learning.

Unfortunately, instructional materials are sometimes lacking, not available or not suitable. This is because they are very expensive and some are sophisticated to come by in our local environment. A number of studies have indicated the non-availability of instructional materials in most schools. Omeje and Ila (2015)^[10] in an analysis noted that quantum of instructional materials was inadequate. They opined that the extent of availability of instructional materials for teaching and learning in secondary schools affect quality of education. Effiong and Igiri (2015)^[15] opined that one of the reasons why students in our secondary schools sometime find it difficult to comprehend immediately what is being taught by the teacher is the non-availability of instructional materials that can easily convey the message of the lesson to the learners. Where this condition abounds (lack or inadequate instructional materials), the teacher resorts to improvisation.

Improvisation in education is the act of producing new things that are important and that will enhance teaching and learning effectively in the absence of the original materials. Eshiet (2001) explained improvisation with respect to Science teaching to mean the sourcing, selection and deployment of relevant instructional element of the teaching and learning processes in the absence or shortage of standard or accredited teaching and learning elements for a meaningful realization of specified educational goals and objectives. It is also the act of using alternative materials and resources to facilitate instructions whenever there is lack or shortage of specific first-hand teaching aids. Eshiet (2001) pointed out that the act of sourcing for instructional materials when the standard ones are not available is improvisation. It is the choice of the best instructional material which enables the teacher to achieve some carefully specified educational objectives. Teachers who adapt appropriate improvisation materials in teaching chemistry will likely be more successful in imparting chemistry knowledge to the novice chemists in their classes. Improvisation is necessary because every day we encounter situations that are full of new demands. Improvisation can be role substitution in which the original item generally requires little or no modification before it can be used to fulfill the teaching need of the class such as the use of kerosene stove as a burner, or a glass tumbler as a beaker. It can also be role stimulation, which is the actual construction of a new improvised material as an emergency measure when the needed instructional material is either too expensive or not available. An example is the use of a local carpenter to construct test tube racks, tripod stands, balance and test tube holders. The application of improvised instructional materials as alternative materials in the teaching – learning process to supplement insufficient standard materials and verbal explanation of concepts has gained grounds in modern educational practices. Okendu (2012)^[8] asserted that regular instructional supervision has a significant bearing on students' academic performance. He also, affirmed that adequate supply of instructional resources has significant effect on students' academic performance. Onasanya & Omosewo (2011)^[12] confirmed that both standard and improvised instructional materials have the same positive effects on students' academic performance. Oladejo, Olosunde, Ojebisi and Isola (2011)^[9] also concluded that the utilization of improvised instructional materials promotes and enhance effective teaching-learning process in physics. They identified two main constraints militating against the successful improvisation of science equipment. These are the technical and the human factors respectively. While the technical factors relate to the question of degree of accuracy and precision that is possible with the improvised equipment, the human factor relates to the teachers' skill in developing the resources while providing the appropriate learning experience to the learners.

According to Hamann and Gillespie (2009)^[6], improvisation is a teaching tool that can be accessible to teachers from many backgrounds. Unfortunately, some teachers see improvisation as something that people either do or do not do. The attitude of teachers toward any subject matter especially improvisation, influences what is taught, how it is taught, and who is expected to be able to learn it (Asare, Parker, Osei-imah, 2018)^[3]. Attitude here is the teacher's expectation of a positive or negative outcome

based on social acceptance and student achievement. Potentially, teachers can gain as much science and pedagogical growth as students from using improvisation as a teaching tool, but attitude may be a factor in teachers' capacity to adapt. Teachers need to be involved and supportive if students are to learn and use improvisation. Asare, Parker, Osei-imah (2018) [3] observed that some teachers are rigid that they cannot come out with any artefact on their own in place of the unavailable teaching and learning instructional materials. Such teachers are not resourceful and lack creative thinking which makes them feel lazy in producing improvised instructional materials to enhance his or her teaching. Some teachers think that the materials that could be used to produce improvised instructional materials are difficult to come by. Some science teachers are of the view that, the use of improvised instructional materials during teaching and learning process brings about lowers of standards of science. Yet some science teachers also feel reluctant in producing improvised instructional materials with the idea that, improvised materials would make learners not to be abreast with the use of modern equipment. This is in addition to the fact that the production of improvised materials increases the work load on teachers. Some science teachers see improvisation to be an extra duty for them. Some teachers think their work is to go to the classroom to teach. For this reason, they tend to ignore improvisational activity with the notion that it is not part of their work. All these go a long way in influencing the attitude of the teacher towards improvisation and the use of improvised materials for teaching and learning science subjects in schools. There is no doubt that effective teaching of the sciences will be a mirage without relevant instructional materials. Potentially, teachers can gain as much science and pedagogical growth as students from using improvisation as a teaching tool, but attitude may be a factor in teachers' capacity to adapt. Unfortunately, very little research and writing has been done recently to describe the attitudes of teachers regarding the success and use of improvisation as a teaching tool, especially in schools where the real teaching materials are not available in the study area of Jos South, Plateau state Nigeria. This fact necessitates the conduct of this study in order to investigate science teachers' attitude towards improvisation and the use of such materials in science classrooms.

Aim and Objectives

The aim of this study is to undertake a survey of science teachers' attitude towards the improvisation and utilization

of improvised materials in Jos south, Nigeria. The specific objectives include

1. To find out if science teachers consider improvisation important in teaching and learning in science classrooms
2. To find out if science teachers use improvised materials for teaching
3. To find out the attitude of science teachers towards improvisation of science teaching materials

Research Questions

1. What is the percentage of science teachers that use improvised materials for teaching?
2. What views do science teachers in Jos South hold concerning improvisation and utilization of improvised materials
3. What is the general attitude of science teachers towards improvisation of science teaching materials?

Methodology

A descriptive survey design was adopted for this study. It is a survey in which science teachers are studied by collecting and analyzing data from only a few teachers considered to be representative of the entire group. The researcher used the data obtained for analysis and to generalize and apply the findings to the entire population. The survey questionnaire consisted of four-point Likert scale items and qualitative items that were developed from and linked to the reviewed literature. The scale consisted of 10 items to which teachers were expected to indicate their opinions (which translate into their attitude) concerning the item. The four-point Likert scale had the following as key:

SA = strongly agree

A = Agree

D = Disagree

SD = Strongly disagree

120 science teachers (chemistry, physics, basic science and biology teachers) were randomly selected and administered the questionnaire. The 120 questionnaires were fully answered and returned to the researcher. The data were analyzed using frequency counts and percentages.

Results

This study was carried out to find out science teachers' attitude towards the improvisation and utilization of improvised materials in the teaching of sciences in secondary school in Jos, Nigeria. The table below gives the analyses of responses of the teachers to the items in the Likert scale.

Table 1: Response of science teachers to improvisation of materials

S/No	Item	SA	A D	D	SD
1.	I use improvised materials when teaching students	28(23%)	40(33%)	31(26%)	21(18%)
2.	Improvised materials lower standards and achievement	28(23%)	38(32%)	26(22%)	28(23%)
3.	Improvised materials breed misconception among students	33(28%)	42(35%)	23(19%)	22(18%)
4.	Improvised materials are not durable and long-lasting	28(23%)	37(31%)	28(23%)	27(23%)
5.	The preparation of improvised materials is tedious and takes much time	33(28%)	42(35%)	26(22%)	19(16%)
6.	It is expensive to produce improvised materials	30(25%)	48(40%)	24(20%)	18(15%)
7.	I lack the technical know-how & creativity to improvise instructional materials	29(24%)	38(32%)	37(31%)	16(13%)
8.	I value the use of improvised materials based on previous experiences	18(15%)	23(19%)	42(35%)	37(31%)
9.	Resources needed to produce improvised instructional materials are difficult to come by	23(19%)	41(34%)	35(29%)	21(18%)
10.	My class size is too large for any improvisation	29(24%)	40(33%)	30(25%)	21(18%)

Source: Field Survey June 2023

One of the findings of the study was that majority (68/56%) of the science teachers said they use improvised materials for teaching their science subjects. Analysis of item one also showed that 52 (44%) of the teachers disagreed with the item and do not use improvised materials for teaching. This position held by the teachers is further strengthened by their response to item 8 in which they disagreed with the statement that they value the use of improvised materials based on previous experiences. 79 (66%) science teachers disagreed with that notion and only 41 (34%) agreed that they are using improvised materials based on their previous experiences. The finding here agreed with that of Inyang who found out that improvised materials are mostly utilized by Biology teachers in teaching the subject in Uruan Local Government Area. The finding however, disagreed with that of Asare, Parker, Osei-imah (2018) ^[3] who found that majority of science teachers do not use improvised materials in junior high schools in Aowin municipality-Ghana.

Another finding of the study was that the use of improvised materials does not enhance higher achievement of students but breeds misconceptions among students. Analysis of items 2 and 3 respectively revealed that 66 (55%) and 75 (63%) of the respondents agreed to this. Similar analyses of the items showed only 54 (45%) and 45 (37%) of the teachers disagreed. By this, the respondents are saying that the use of improvised materials in Jos South is not beneficial to students and teachers alike. This finding agreed with that of Bassey (2002) ^[4], who reported that students taught with the standardized instructional materials had the highest achievement while those taught with improvised materials scored lowest. Asare, Parker, Osei-imah (2018) ^[3] also found that the use of improvised materials lowered academic achievement of students. The finding is at variant with that of Onasanya & Omosewo (2011) ^[12] who concluded improvised instructional materials have the same positive effects as original instructional materials on students' academic performance. Oladejo, Olosunde, Ojebisi and Isola (2011) ^[9] also concluded that the utilization of improvised instructional materials promotes and enhance effective teaching-learning process in physics. The analyses of item showed that improvised instructional materials are not durable or long-lasting. This means they easily get spoilt or do not withstand stress. 65 (54%) of the teachers agreed with this position while 46% disagreed. Asare, Parker, Osei-imah (2018) ^[3] established this fact in a similar study earlier carried out in Ghana. This view has the potentials of influencing teachers' attitude towards improvisation and the use of improvised instructional materials.

Another finding of the study is that it is not easy to improvise instructional materials in terms time and cost. 75 (63%) of the teachers while responding to item 5 agreed that improvisation is tedious and takes much time. Responding to item 6, majority of the teachers (78/65%) agreed that improvising instructional materials is expensive. Only a few (42/35%) believed that improvisation is cheap. Item 9 indicates that the resources needed to produce improvised instructional materials are difficult to come by thereby contributing to the difficulty in improvising materials for teaching science. Asare, Parker, Osei-imah (2018) ^[3] discovered that the production of instructional materials is time – consuming and tedious. However, they disagreed that improvised materials are expensive to produce. According to Riveire (2006), improvisation may be sacrificed due to

shortages of resources, including time, money, and lack of teacher experience in improvisation.

The analysis of item 7 revealed another finding: the teachers agreed that they lacked the technical know-how and creativity to improvise materials. 67 (56%) agreed they lacked the knowledge. Only 53 (44%) agreed they can improvise materials. This finding agreed with that of Utibe-Abasi (2015) ^[16] who found out that one of the factors teachers do not improvise materials is their lack of exposure on improvisation and lack of skills and strategies on improvisation. Riverie (2006) noted that one of the reasons teachers may not incorporate improvisation is lack of personal experience. As teachers emulate the methods used in their own education, lack of improvisation in their training may discourage them from using it (Riveire, 2006; Volz, 2005) ^[17]. When a teacher is fearful, lacks confidence, or does not value the use of improvised materials based on previous experiences, there is a higher likelihood it would not be included in his or her instruction.

The teachers' response to item 10 on the issue of large class size, 69 (57%) of the teachers agreed that their large class sizes constitute a problem to improvisation of materials. 51 (43%) disagreed with this claim. The finding here agrees with that of Utibe- Abasi (2015) ^[16] who found out that financial constraints, lack of skills and strategies on improvisation, large class size, time constraint and school location are among the problems that confront improvisation of instructional materials.

Conclusion and recommendation

The results generally show that the science teachers' attitude towards improvisation and the use of improvised teaching materials was not good. Even though they make use of improvised materials, they are not favorably disposed towards the production of improvised materials due to various reasons which include the cost, time, non-durability, lack the technical know-how & creativity, lack of the resources and the tedious nature of making the materials. The teachers opined that the use of improvised materials lower academic achievement of students and breeds misconception. It can therefore be concluded that they science teachers have poor attitude towards improvisation and the utilization of improvised materials.

Based on the findings and conclusion above, the study recommends that the State Ministry of Education organizes workshops for teachers on improvisation during which they will be taught how to improvise simple instructional materials. The gains of improvisation should be taught teachers to appreciate it and not to focus on the rigorous process of improvising materials. The teachers should be encouraged to produce and use improvised materials made from local raw materials obtainable in their environments to reduce cost. They should engage their students in sourcing for the raw materials from the local environment in order to arouse their interest in the subject. There is also need for the development of positive attitudes by teachers towards improvisation and the use of improvised materials for their students. The government should make educational technology a compulsory course in teachers' training institutions at all levels.

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