



Factors Hindering Effective Production and Utilization of Teacher-Made Instructional Materials in Teaching Senior Secondary Chemistry in Federal Capital Territory, Abuja, Nigeria

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Abstract

The study was designed to investigate the factors hindering effective production and utilization of teacher-made instructional materials for teaching senior secondary school chemistry in Federal Capital Territory (FCT), Abuja. Four research questions and one hypothesis guided the study. A descriptive survey design was used. The population consisted of 121 chemistry teachers of public senior secondary schools in FCT, Abuja. There was no sampling, rather the entire population served as the subjects. The instrument for data collection was 26-items structured questionnaire titled factors hindering effective production and utilization of improvised instructional materials questionnaire (FHEPUIIMQ, $r = 0.85$). Data collected were analysed using mean, standard deviation and t – test at 0.05 level of significance. The finding of the study revealed that inadequate training, poor funding, lack of functional workshops, lack of supervision of chemistry teachers, poor motivation, large class size were among the factors hindering effective production and utilization of teacher-made instructional materials in teaching chemistry. The results also showed that gender had no significant influence on the mean responses of teachers on the factors hindering effective utilization of teacher-made instructional materials for teaching chemistry. Recommendations were made among others; chemistry teachers should attend seminars, workshops and conferences to improve their knowledge and skills on production and utilization of teacher-made instructional materials.

Keywords: Hindering, effective production and utilization, teacher made, improvisation, instructional materials

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INTRODUCTION

The primary aim of education is to make learners capable of being responsible, productive and useful member of the society. That is why Nigeria Government sees education as an instrument per excellent for individual and national development. It is therefore important to give education a solid foundation through effective teaching and learning. This will ensure that knowledge, skills, attitudes and appreciations are built through classroom interaction pattern of the teacher and the learners. But, Megbo and Saka (2005) pointed out that effective teaching cannot be fully accomplished without the use of instructional materials. Agina (2005) defined instructional materials as concrete or physical objects which provide sound, visual or both to the sense organs during teaching. Abimbola and Udonsoro (1997) defined instructional materials as two or three dimensional aids used by a teacher in order to save students from wondering in imagination and to keep their understanding. Agbulu and Wever (2011) pointed out that instructional materials are important because they help both teacher and students to overcome physical limitations during lesson presentation among others. Giginna and Nweze (2014) while citing Onwudinor and Onwudiafor (1999) emphasized on the importance of instructional materials as follows: Concretizing abstract concepts, stimulating students' attention and interest, arousing students' curiosity and promoting students' active participation in the classroom.

In spite of the importance and emphasis that chemistry teachers should select and use instructional materials in the teaching and learning chemistry, research reports have shown that chemistry teachers teach without using instructional materials. The commonest reason, they give for this is that already made ones are not available in the schools (Ezeliora, 1999; Eriba, Ogbeba & Ityo, 2015). The teachers' view was supported by the assertion of National Teachers Institute (2011) that most of the instructional materials used for teaching and learning in schools are expensive and not readily available. This situation has worsened in the present days due to economic recession and high exchange rate of dollar to naira that makes it impossible for many schools to purchase enough instructional materials. Therefore, chemistry teachers and students have been called upon to improvise the necessary instructional materials.

Bomide (1985) defined improvisation as an act of using instructional materials obtainable from the local environment designed either by the science teacher or with the help of local personnel's to enhance instruction. Adebimpe (1997) defined improvisation as a way of widening inquiry, curiosity creativity and productive application of intellect in the local application of universality of science. In line with the last definition, Ezekannagba and Ifeakor (2000) while citing Ikeagu (1999) observed that improvisation help students and teachers to: participate in creative and analytical thinking; acquire problem solving and manipulative skills, acquire scientific attitudes among others. Olagunju (2000) summarized the reasons for improvisation as follows:

- Fulfill science education objectives;
- Substituting alternative where standard equipment are not available;
- Reducing cost;
- Promote creative and technical skills;
- To meet the high demand of coping with large class;
- Conserve foreign exchange earnings from improvisation of equipment.

Achimugu (1995) defined improvisation as the teacher-made teaching material used by him or her to facilitate instructions. The focus of this study is on teacher-made instructional material. The inability of teachers to produce, select and use teacher-made instructional materials is a great dis-service to science education. Based on the above premises, this study was designed to investigate the factors hindering effective production and utilization of teacher-made instructional materials in teaching and learning chemistry in secondary school in Federal Capital Territory, Abuja.

Problem of the Study

Many chemistry education researchers have stressed the benefits of improvisation of instructional material and the ease with which these improvised materials can be produced or obtained (Achimugu 1995, Ezeliora 1999). Chemistry teachers have been called upon to make and use them. It is disheartening to note that chemistry teachers are almost ignorant of how to produce or obtain the instructional materials. Very related to this issue is that chemistry teachers find it difficult to use teacher - made instructional materials in teaching chemistry (Eshiet 1996). The availability and adequate provision of instructional material are important but more important is the extent to which teachers utilize these materials in the classrooms to improve the teaching-learning process. Therefore, the problems hindering teacher's effective utilization of teacher-made instructional material need to be giving a closer study. Hence the need to investigate factors that hinder effective production and utilization of teacher-made instructional materials in the teaching of chemistry.

Purpose of the Study

The general purpose of this study is to ascertain the factors hindering the effective production and use of teacher - made instructional materials in teaching chemistry in senior secondary school in FCT, Abuja. Specifically, the study sought to find out:

- Factors hindering the effective production of teacher - made instructional materials for teaching chemistry in senior secondary schools;
- Factors hindering the effective utilization of teacher - made instructional materials for teaching chemistry in senior secondary schools;
- Measures that could be employed to improve the utilization of teacher - made instructional materials for teaching chemistry in senior secondary schools;
- The roles of gender on the factors hindering effective utilization of teacher - made instructional materials for teaching chemistry in senior secondary schools.

Research Questions

- What are the factors hindering effective production of teacher - made instructional materials for teaching chemistry in senior secondary schools?
- What are the factors hindering effective utilization of teacher - made instructional materials for teaching chemistry in senior secondary schools?
- What measures could be employed to improve the utilization of teacher - made instructional materials for teaching chemistry in senior secondary schools?

- To what extent do gender influence chemistry teachers on the factors hindering effective utilization of teacher - made instructional materials in teaching chemistry in senior secondary schools?

Hypothesis

- Ho: There is no significant difference in the mean rating of male and female teachers on the factors hindering effective utilization of teacher - made instructional materials in teaching chemistry in senior secondary schools

METHODS

A descriptive survey design was used for the study. The study was carried out in senior secondary schools in Federal Capital Territory, Abuja. The target population was the entire 121 chemistry teachers in (47 males and 74 females) in 66 public senior secondary schools in FCT, Abuja. There was no sampling as the entire population of chemistry teachers was studied. The instrument used for data collection was structured questionnaire tagged: Factors Hindering Effective Production and Utilization of Instructional Materials Questionnaire (FHEPUIMQ). The questionnaire consisted of four sections. Section A sought information on personal data of the respondents; Section B sought information on factors hindering effective production of improvised instructional materials; Section C sought information on factors hindering effective utilization of improvised instructional materials and section D sought information on measures that are could be employed to enhance chemistry teachers' utilization of improvised instructional materials. The instrument was a four point rating scale of strongly Agree (SA) = 4, Agree (A) = 3, Disagree (DA) =2 and Strongly Disagree (SD) = 1 for positive statements. The questionnaire was validated by two specialists in chemistry education and another two specialists in educational measurement and evaluation. Their comments and suggestions led to the emergence of the final copy of the questionnaire. The instrument was trial tested on 30 chemistry teachers from senior secondary schools from Kogi State that were not part of the study. The result was used to determine the reliability of the instrument using Cronbach Alpha technique and reliability index of 0.85 was established. This value was considered high enough and reliable for the study. Face to face method of administration of questionnaire was adopted with the help of six trained research assistants (one research assistant per area council) to ensure a 100 percent return. Mean and standard deviation were used in answering the research questions while t – test was used in testing the hypothesis at 0.05 significance level. The criterion means value was 2.50 and items with mean values of 2.50 and above were regarded as significant/agreed while those with mean values less than 2.50 were regarded as insignificant/disagreed.

RESULTS

The results were presented according to the research questions and the hypothesis as seen on tables 1, 2, 3, 4 and 5 below.

Research Question One

What are the factors hindering effective production of teacher - made instructional materials for teaching chemistry in senior secondary schools?

Table 1: Mean Ratings and Standard Deviation of Chemistry Teachers on Factors Hindering Effective Production of Teacher - Made Instructional Materials for teaching chemistry

S/N	Questionnaire Statements	Mean	SD	Decision
1.	Shallow knowledge of teachers on how to produce improvised materials	2.66	0.52	Agreed
2.	Increasing rate of the cost of materials used for the production	2.89	0.40	Agreed
3.	Lack of knowledge of the available local materials	1.54	0.62	Disagreed
4.	Lack of needed tools for improvisation	3.11	0.55	Agreed
5.	Teachers' lack of interest on the arts of improvisation	2.37	0.70	Disagreed
6.	Poor motivation of teachers	3.14	0.42	Agreed
7.	Teachers are scared of the messy and unsafe nature of improvisation of instructional materials	2.00	0.63	Disagreed
8.	Unwillingness of the school principals to spend money on improvisation of instructional materials	3.01	0.42	Agreed
9.	Producing improvised materials are energy and time consuming	2.93	0.68	Agreed
10.	Lack of cooperation among teachers themselves and among them and the local resources person	1.94	0.80	Disagreed

From table 1, six items (1, 2, 4, 6, 8 and 9) were rated above 2.50, which imply that the teachers agreed with the statements as factors that hinder effective production of improvised instructional materials for chemistry instruction. However, the four items (3, 5, 7 and 10) were rated below the cut-off mean of 2.50 which implies that the teachers disagreed with the item statements as factors that hinder effective production of instructional materials for chemistry education.

Research Question Two

What are the factors hindering effective utilization of teacher - made materials for teaching chemistry in senior secondary schools?

Table 2: Mean Ratings and Standard Deviation of Chemistry Teachers' Responses on the Factors Hindering Effective Utilization of Teacher - Made Instructional Materials for Chemistry Instruction

S/N	Item Statement	Mean	SD	Decision
11	Growing students' population resulting to unmanageable class size.	3.46	0.67	Agreed
12	Voluminous nature of syllabus and pressure to cover it.	3.61	0.71	Agreed
13.	Teachers are weighed down by heavy work loads	3.15	0.65	Agreed
14.	Improper functioning of teacher - made instructional materials.	2.11	0.79	Disagreed
15.	Lack of technical skills and knowledge required for the usage of teacher - made instructional materials	2.84	0.54	Agreed
16	Lack of interest in teaching profession.	2.18	0.71	Disagreed
17	Nonpayment of inducement allowance (ie science allowance) to chemistry teachers	3.11	0.65	Agreed
18	Inadequacy of qualified chemistry teachers	2.56	0.86	Agreed
19	Lack of precision of the teacher - made instructional materials.	2.75	0.94	Agreed
20	Lack of maintenance and care of teacher - made instructional materials.	2.16	0.77	Disagreed
Grand total mean/ standard derivation		3.06	0.80	Agreed

From table 2, the mean rating of items 11, 12,13, 15, 17, 18 and 19 were above the mean of 2.50. This implies that the teachers agreed with the statements on the questionnaire as the factors hindering the effective utilization of teacher made instructional materials in teaching chemistry. However, items 14, 16, and 20 have mean rating values below the criterion mean of 2.50. This shows that the teachers disagreed with the statements on the questionnaire as the factors hindering the effective utilization of teacher made instructional materials in teaching chemistry. The grand mean of 3.06 indicates that the teachers agreed with the majority of the items as factors hindering the effective utilization of teacher made instructional materials in teaching chemistry.

Research Question Three

What measures could be employed to improve the utilization of teacher - made instructional materials for teaching chemistry in senior secondary schools.

Table 3: Mean Ratings and Standard Deviation of Chemistry Teachers' Responses on Measures That Could be Employed to Improve the Utilization of Teacher -Made Instructional Materials

S/N	Measures	Mean	SD	Decision
21	Provision of well-equipped workshops	2.72	1.06	Agreed
22	Provision of adequate fund to purchase materials for improvisation.	3.35	0.83	Agreed
23	Re-training of chemistry teachers on the knowledge and skills in improvisation.	3.54	0.80	Agreed
24.	Motivation of chemistry teacher such as payment of science allowance	3.38	0.75	Agreed
25	Strict supervision of chemistry teachers on the production and utilization of instructional materials in teaching.	2.79	1.0	Agreed
26	Employment of qualified chemistry teachers.	2.51	0.9	Agreed
Grand mean/Standard deviation		3.35	0.98	Agreed

In table 3, the items which chemistry teachers agreed to be the factor that hinder effective utilization of teacher-made instructional materials for teaching chemistry were 21, 22, 23, 24, 25 and 26. The grand mean of 3.35 implies that the teachers agreed with the items as measures that could be employed to improve the utilization of the instructional materials.

Research Question Four

To what extent does gender influence chemistry teachers on the factors hindering effective utilization of teacher made instructional materials?

Table 4: Overall Mean and Standard Deviation Scores of Male and Female Teachers on Factors Hindering Effective Utilization of teacher made Instructional Materials in Teaching Chemistry

Gender	Number of Subjects	Mean	Standard deviation
Male	47	2.80	0.70
Female	74	2.66	0.76

From table 4, the male teachers have the overall mean of 2.80 while the female counterparts have the overall mean of 2.66. This means that gender to some extent has influence on chemistry teachers' responses on factor hindering effective utilization of teacher – made instructional materials in teaching in favour of male. However, the subsequent analysis of supportive hypothesis shall show whether the difference is significant or not.

Hypothesis

Ho₁: There is no significant difference between the mean rating scores of male and female teachers on the factors hindering effective utilization of teacher – made instructional materials for teaching chemistry in senior secondary schools?

Table 5: T – Test Analysis on the Mean Response of Male and Female Teachers on Factors Hindering Effective Utilization of Teacher – Made Instructional Materials for Teaching Chemistry

Group	N	X	SD	Df	t-cal.	t-table
Male	47	2.80	0.70	119	1.63	1.98
Female	74	2.66	0.76			

From table 5, t-calculated (1.63) is less than t-critical (1.98) at 0.05 level of significance. And as such, the null hypothesis was not rejected. It shows that gender had no significant effect on chemistry teachers' responses on the factors hindering effective utilization of teacher-made instructional materials in teaching.

DISCUSSION

From table 1, the study showed that ineffective production of teacher - made instructional materials for chemistry teaching were as a result of: shallow knowledge of teachers, increasing rate of the cost of materials, lack of needed tools; poor motivation of teachers; unwillingness of the school principals to spend money; and time consuming nature of improvisation. The findings of this study on the shallow knowledge of teachers is in agreement with the finding of Uka (2007) who discovered that inadequate training of teachers in subject matters leave them with lack of inventive potentials to produce and use the necessary facilities to concretize their lessons.

The finding of this study on table 2 revealed that chemistry teachers agreed that factors that hinder effective utilization teacher - made instructional materials include; unmanageable class size, pressure on teachers to cover the syllabus, teachers' heavy workloads, lack of skills and knowledge required for the usage, lack of incentives for teachers, inadequacy of qualified chemistry teachers and lack of precision of the teacher-made instructional materials. This finding collaborates with the findings of Igwe, Ariba and Ibe (2013) who also revealed that lack of exposure to knowledge, time constraints, unavailability of right tools and prevalence of large classes in most schools among others are major factors hindering effective improvisation and use of improvised teaching materials. The finding on lack of motivation of teachers affirmed the view of Ngwoke (1997) who pointed out that lack of motivation hinders response and would stifle the creativity and the innate potentials of teachers with the negative answer that "*I cannot do it*". The implication is that chemistry teachers apart from their monthly salaries should be paid

science (inducement) allowance in order to bring out the best from them in all aspect of teaching and learning processes.

The result of this study on table 3 shows that certain factors such as provision of well-equipped workshops, adequate fund to purchase materials, retraining of chemistry teachers; motivation of teachers, implementation and employment of qualified chemistry teachers enhance the production and utilization of teacher – made instructional materials for chemistry education. This finding is in conformity with the finding of Onwuachi (2011) who reported that the provision of: well-equipped laboratories, sufficient fund, in-service training, attendance to workshops/seminars and motivation of science teachers are the strategies for effective utilization of material resources for teaching and learning of science subjects.

The result of this study in table 4 shows that there was difference in mean responses of male and female chemistry teachers on the factors hindering effective utilization of teacher-made instructional materials in teaching chemistry with the males having higher mean scores than their female counterparts. But further analysis on table 5, revealed that the observed difference was by chance, as there was no significant difference between the male and female teachers in their responses on the factors hindering effective utilization of teacher - made instructional materials. This implies that there is unanimity in the responses of teachers on factors hindering effective utilization of teacher-made instructional materials in respective of the gender type. Obviously, this confirms that male and female teachers face similar constraints that hinder them from effective utilization of teacher - made instructional materials for teaching and learning chemistry in senior secondary schools.

CONCLUSION

The findings of this study have provided the basis for the researcher to draw the conclusion that certain factors such as poor funding, lack of needed tools, poor motivation of teachers, inadequate training, large class size, lack of skills and knowledge, lack of supervision, lack of motivation, lack of qualified teachers among others hinder effective utilization of teacher - made instructional materials for teaching and learning chemistry. The researchers also concludes that factors that hinder effective utilization of teacher-made instructional materials by chemistry teachers are not gender based as there was no significant difference in the mean responses of male and female teachers on the level of production and utilization of instructional material for chemistry instruction. Conclusively, all stakeholders in chemistry education are called upon to intensify efforts towards the production and utilization of teacher made instructional materials for effective teaching and learning of chemistry in senior secondary schools in FCT, Abuja.

Recommendations

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

- Chemistry teachers are encouraged to attend seminars, workshops and conferences in order to improve their knowledge and skills in handling the production and utilization of instructional materials;
- Training of student–teachers should be reviewed to emphasize knowledge and skills related to the production and use of instructional materials;

- Adequate fund should be provided for the procurement of tools and materials needed for production of teacher-made instructional materials;
- Functional workshop for improvisation of instructional materials should be provided in all the senior secondary schools in FCT, Abuja;
- Stakeholders (Government at various levels and school principals) should ensure that chemistry teachers are adequately motivated to carry-out their professional duties such as improvisation of instructional materials.

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