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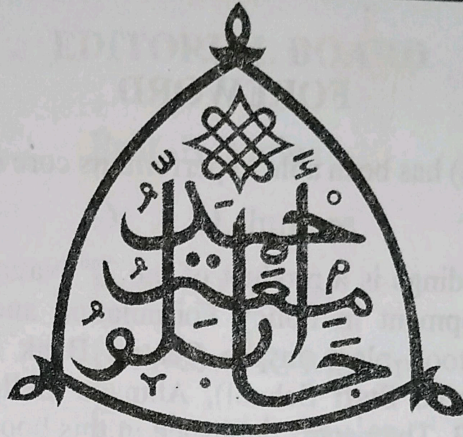
**RESEARCH AND DEVELOPMENT
IN POLICY FORMULATION
AND IMPLEMENTATION IN
NIGERIAN EDUCATIONAL SYSTEM**

Held from Tuesday, 14th to Friday, 17th February, 2023
At: CBN Centre for Economics and Finance, Centre of Excellence,
(Behind Staff School), Ahmadu Bello University, Zaria.

DR. M. U. S. KOROKA

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2023 Proceedings of the 2nd National Conference on Research and Development of the Institute of Education, Ahmadu Bello University, Zaria.



PROCEEDINGS

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OF THE

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FOREWORD

The Institute of Education (IOE) has been able to perform its core mandates of Research, Training and Development in Education.

This maiden edition of proceedings is a product of the 2nd National Conference of IOE on the theme “Research and Development in Policy Formulation and Implementation in Nigerian Educational System” which took place in the Central Bank of Nigeria (CBN) Centre for Economics and Finance (Behind Staff School), Ahmadu Bello University, Zaria from 14th February – 17th February, 2023. The papers published in this book which among others include: Research and Development in Policy Formulation and Implementation at Tertiary Level of Education: Challenges and Way Forward..., Policy Formulation and Implementation on the use of Technological Tools in Legal Research and Education in Nigeria..., Implementation of Children’s Right to Education: An Appraisal of the Legal Frameworks in Nigeria..., constitute a good source of information to education community as they are specifically tailored to address current educational needs of the nation.

Indeed, the IOE is immensely grateful to the participants, contributors and to the Executive Secretary, Universal Basic Education Commission (UBEC), for rendering support towards the success of the conference.

I am highly glad to recommend this publication to all education stakeholders, academic, scientists, professionals, the general public and relevant agencies around the nation.

Prof. M.M. Atadoga

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WELCOME ADDRESS BY THE

VICE-CHANCELLOR DURING THE 2ND NATIONAL CONFERENCE OF THE INSTITUTE OF EDUCATION, AHMADU BELLO UNIVERSITY, ZARIA ON 14TH FEBRUARY, 2023

1. PROTOCOL
2. ESTABLISHMENT OF INSTITUTE OF EDUCATION

The Institute of Education, Ahmadu Bello University, Zaria, being a Pioneer Institute of Education in Nigeria was established by the Law of Northern Nigeria, law Number 10 of 1965 with Core Mandate to carry out Research, Training and Development in Education. On record, therefore, the Institute of Education has conducted numerous Seminars, Workshops and Training in the Country.

3. CONDUCT OF NATIONAL CONFRENCES

In September, 2021, the Institute of Education conducted its 1st National Conference on "Research, Training and Development in Nigerian Educational System in the 21st Century: Challenges and Way forward".

The 2nd National Conference is titled, "Research and Development in Policy Formulation and Implementation in Nigerian Educational System. It is my belief that the Theme of this Conference was carefully chosen with the aim of addressing the current issues on Policy Formulation and Implementation at the Tertiary, Secondary and Primary levels of Education. This, to my mind, depicts the Core Mandate of the Institute of Education. I strongly believe that the Three Scholars selected from different parts of the country, with assigned tasks given to them, will lead and guide the presentations of participants in this Conference.

While welcoming you all to this Conference, on behalf of the Management, Staff and Students of Ahmadu Bello University, Zaria, I wish to commend the Institute of Education for the Giant Stride in creating avenue for scholars to discuss issues on education, which we all know is a Vehicle for National Re-orientation and Development in Nigeria.

Let me use this medium to invite all our visitors to visit places of interest in the University as follows:

- a. Ahmadu Bello University Centre of Excellence;
- b. Ahmadu Bello University Dam;
- c. Ahmadu Bello University Gymnasium;
- d. Ahmadu Bello University School of Postgraduate Studies; and
- e. Ahmadu Bello University Phase II

Thank you and I wish you successful deliberation during the Conference.

Prof. Kabiru Bala
Vice Chancellor,
Ahmadu Bello University, Zaria

TABLE OF CONTENTS

S/NO.	PAPER TITLE	AUTHOR(S)	PAGE
1.	WELCOME ADDRESS	PROF. KABIRU BALA	iv
2.	KEYNOTE ADDRESS	PROF. BASHIR MAINA	1
3.	EFFECTS OF IMPROVISED INSTRUCTIONAL MATERIALS ON ACHIEVEMENT IN BIOLOGY AMONG SENIOR SECONDARY SCHOOL STUDENTS IN MINNA, NIGER STATE	KOROKA, M. U. S.	4
4.	ASSESSMENT OF IMPLEMENTATION OF EDUCATIONAL POLICY IN PUBLIC SECONDARY LEVEL OF EDUCATION IN KOGI STATE, NIGERIA	SHEIDU James Abdullahi, MUKHTARI, Fatima and ABUH, Charity Aladi	11
5.	SEROPREVALENCE OF TOXOPLASMOSIS AND ASSOCIATED RISK FACTORS IN SELECTED DOMESTIC ANIMALS (GOAT, DOG AND CHICKEN) IN MINNA, NIGER STATE, NIGERIA.	AJIBOGUN O.O AND OMALU I.C.J.	19
6.	GEO-SPATIAL DISTRIBUTION OF FRESHWATER SNAIL INTERMEDIATE HOST AND MOLLUSCICIDAL EFFICACY OF JATROPHA TANJORENSIS FOR THE CONTROL OF BULINUS TRUNCATUS IN MINNA.	GANIYU, I., ABOLARINWA, S. O., UKUBUTWE, A. C., OMALU, I. C.J., ABE, E.M., and BALA E	26
7.	SEROPREVALENCE OF TOXOPLASMOSIS AND ASSOCIATED RISK FACTORS AMONG PREGNANT WOMEN ATTENDING GENERAL HOSPITAL, MINNA, NIGERIA	IBRAHIM, M. A., OMALU, I. C. J., ADENIYI, K. A and UKUBUIWE, A. C	33
8.	HUSBANDS' REPRODUCTIVE HEALTH EDUCATION: AN INTERVENTIONAL TOOL FOR IMPROVING UTILIZATION OF ANTENATAL CARE SERVICES IN KADUNA STATE, NIGERIA.	MOHAMMED H.S & SALIHU A. A	42
9.	INFLUENCE OF RESEARCH AND DEVELOPMENT ON SMALLHOLDER COCOA FARMERS' PARTICIPATION IN COCOA REHABILITATION PROGRAMME IN OYO STATE, NIGERIA	ADISA Rahamatallahi Adewumi, JAMILU Alhaji Abdullahi, ABDULLAHI Hussein Ahmed, 2ISSA Fadlullah Olayiwola and OBA Abdulkadir Ibrahim	48
10.	EFFECT OF PROJECT-BASED AND DEMONSTRATION TEACHING STRATEGIES ON STUDENTS LEARNING OUTCOMES IN GENERAL METALWORK IN KWARA AND NIGER STATES, NIGERIA.	OMODUN, Joseph Kehinde; Prof. Umar I.Y and Dr. Dauda I.	57
11.	EFFECTS OF CHALLENGE-BASED AND ACTIVITY – BASED APPROACHES ON STUDENTS LEARNING OUTCOMES IN FABRICATION AND WELDING CRAFT PRACTICES IN TECHNICAL COLLEGES IN KADUNA STATE.	BADDE Nehemiah, Prof. Umar I. Y. and Dr. Rufai, A.	66

EFFECTS OF IMPROVISED INSTRUCTIONAL MATERIALS ON ACHIEVEMENT IN BIOLOGY AMONG SENIOR SECONDARY SCHOOL STUDENTS IN MINNA, NIGER STATE

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ABSTRACT

The study examined the Effects of Improvised Instructional Materials on Achievement in Biology among Senior Secondary School Students in Minna, Niger State. The research design used for the study is Quasi-experimental design involving pretest, posttest, experimental and control group design. A total of one hundred and fifty five (155) Senior Secondary two (SSII) students randomly selected from two sampled schools formed the sample size of the study. The instrument used for data collection was a researcher's designed Biology Achievement Test (BAT). The instrument consists of twenty five (25) objective items with four optional answers (A-D) out of which only one is the correct answer. The instrument was validated by experts in science education, after which it was pilot tested and reliability coefficient of 0.82 obtained. The treatment instrument used for this study was the researchers' designed improvised phases of mitosis. Two research questions were raised and two corresponding null hypotheses were formulated to guide the study. The research questions were answered using mean and standard deviation while the null hypotheses were tested at 0.05 level of significant using SPSS version 23.00). The result of the study revealed among others a significant difference in achievement score of the experimental and control groups in favor of the experimental group. Gender difference in achievements was not found. It was recommended among others that Biology teachers should be encouraged to improvise instructional materials for effective teaching and learning of Biology using local materials familiar to the students from the students' immediate environment. This will expand the scope of the students in terms of comprehension or understanding of Biology concepts thereby enhancing students' achievements.

Key Words: Achievement, Biology, Improvisation, Instructional, Materials, Mitosis and Students

Introduction

It is no longer a news that success or failure of every nation lies on the level of educational advancement of her citizenry. This implies that for any nation to attain and sustain national development, a well planned and implemented educational policy must be given proper attention by the government of that nation. In particular, government must see education especially science in particular and science and technology in general as an essential tool for her national development. According to Umoru (2016), knowledge of science is of paramount importance as it explains the existence of living things in our environment, interdependent relationship between living organisms and their environments as well as and how to improve on our way of living. Sheldon (2011) define science as an intellectual activity designed by humans to discover information about the natural world in which humans live and how to discover the ways these information can be organized into meaningful patterns for human satisfaction. Science comprises of basic subjects

like Chemistry, Physics, Mathematics and Biology.

Biology is one of the major branches of science that deals with the study of living organisms and the interdependent relationship between living organisms and their immediate environments. Sarigin (2010) on the other hand sees Biology as a fascinating study that ranges from microscopic and unicellular molecules to the biosphere, encompassing the earth surface and its biotic components. Biology is broad in scope and has been further broken down into several specialized sub-branches like Anatomy, Cell Biology, Genetics, Physiology, Ecology, Evolution just to mention a few. This is one of the reasons why Biology is introduced to students at senior secondary school level of Nigerian educational system as a preparatory ground for human development, where career abilities are groomed, potentials and talents are discovered and energized (FRN, 2013). This is because Biology is a prerequisite subject for the study of some professional courses such as medicine, pharmacy, veterinary medicine, agriculture and many others.

Hence, Biology is a very important subject for national development.

Considering the high value given to Biology in the Nigerian secondary school curriculum, the need to teach it effectively through an effective method is indispensable. Research studies have shown that there is an increased enrolment of students in Biology yearly but the students' achievement at the Senior School Certificate Examinations (SSCE) conducted by the West African Examinations Council (WAEC) and National Examination Council (NECO) is not encouraging (Lawal, 2014 & WAEC, 2016). Many reasons have been advanced for the poor performance of biology students by different researchers. Some of the advanced reasons include inadequate instructional material, lack of qualified teachers and poor instructional strategies employed by some teachers, abstractness or difficult nature of some Biology concepts among others (Ahmed, 2010 & WAEC, 2016). Some of the abstract or difficult concepts of Biology include Evolution, Genetics, Osmosis, Mitosis and Meiosis. Mitosis in particular is so abstract that it cannot easily be comprehended by students when taught without the use of related and relevant instructional material. This is one of the reasons why the students find it difficult to comprehend resulting to poor performance at the final examinations (WAEC, 2016). It is therefore necessary to use relevant instructional materials to teach the concept of Mitosis in biology.

Instructional materials are those channels of communication which promote the effectiveness of instruction and help the teacher to communicate ideas effectively to his student (Ali, 2012). This implies that, instructional materials include all the substantial resources that teachers can use to implement instruction and which can facilitate students' achievement at the final SSCE Examinations. It should be noted that it is not all lessons or topics that can be effectively taught without the use of instructional material (Olumorin *et al.*, 2010). According to Awolaju (2015), Instructional materials play a key role in concretizing learning of science in general. Instructional materials make learning meaningful and help to improve students' level of comprehension of the abstract or difficult concepts. According to Umoru (2016), instructional material enhances, facilitate and make teaching and learning lively and concrete. Adeyemi and Olayeye (2010) investigated the

effect of student involvement in production of instructional material on their academic achievement in Biology and they reported a significant difference between students taught biology without the use of instructional materials and those taught using locally produced instructional materials. Similarly, Oladejo *et al.*, (2011) conducted a research study on the use of standard instructional materials, improvised instructional materials and conventional teaching method on students' academic achievement in physics. They reported that, students taught with improvised instructional materials obtained the highest achievement score at posttest, followed by those with standard instructional materials, while the control group taught with conventional method (material) scores the lowest. The finding shows revealed a difference in the achievement scores of students taught using improvised instructional materials, standard instructional materials and conventional method.

It is therefore very important to note that, the above empirical studies have justified the need to use instructional materials during teaching. However, despite the important and pivotal roles played by instructional materials during instruction, it is disheartening to realize that majority of standard instructional materials are not available in almost all the present-day secondary schools in Nigeria. This therefore necessitates the need for improvisation of instructional materials.

On the issue of gender school attendance and achievement, gender disparity has remained inconclusive. Some research findings are reported in favour of female students, some in favour of male students while some indicates no disparity. For instance, study on gender achievement among biology students at secondary school level conducted by Abdulrahman (2016) and Awolaju (2015) shows that, the use of instructional materials help both male and female students achieve better as compared to the conventional teaching method. Isola (2010) reported that students taught the concept of reproduction in biology with constructive strategy achieved better than those taught using conventional method. It was also reported to be gender friendly. Study by Ogunleye and Babajide (2011) shows no significant effects of gender in science. Other researchers like Adeyemi and Olaleye (2010) and Eze (2012) asserted that gender influences students' achievement in science in favour of female students. From the foregoing reports, it has

become cleared that instructional materials is an essential tool for enhancing students' achievement and also that, gender disparity in education is inconclusive. Unfortunately, these advantages of instructional materials have not reflected at the secondary schools level of Nigeria education system because of the shortage of these instructional materials. This is because as a result of large number of secondary schools, it has become difficult for government to adequately provide all the necessary instructional materials needed by all the schools needs. This informed the idea of using available local materials in place of the real instructional materials to ensure that teaching and learning takes place effectively and efficiently. The use of available local materials to produce instructional materials in the absence of the original instructional materials is referred to as improvisation. It is therefore, the responsibility of the Biology teachers to improvise instructional materials in the absence of the real instruction materials during classroom instruction. This study is therefore aimed at finding out if the use of improvised instructional material can enhance or improve biology students' achievement on the concept of mitosis.

Objectives of the Study

This study is aimed at determining the Effects of Improvised Instructional Materials on Achievement in Biology among Senior Secondary School Students in Minna, Niger State. Specifically, the following objectives guided the study;

1. determine the difference in mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials and those taught with Lecture Method.
2. determine the differences in gender mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials

Research Questions

The following research questions were raised and answered using Mean and Standard Deviation

1. What is the difference between the mean achievement scores of students taught the concept of Mitosis in Biology using

Improvised Instructional Materials and those taught with Lecture Method?

2. What is the difference between the gender mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials?

Research hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significant:

- HO₁: There is no significant difference between the mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials and those taught with Lecture Method
- HO₂: There is no significant difference between the gender mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials

Methodology

The research design used for the study is Quasi-experimental design involving pretest, posttest, experimental and control group. The choice of this design was to avoid interference with the school time table therefore, intact classes were used for the study. The total population of biology student in Minna, Niger State was five thousand, two hundred and twenty six (5,226). The target population (SSII Biology students) was three thousand, four hundred and twenty five 3,425. Sample size used for this study was one hundred and fifty five (155) SSII students. The students were drawn from two intact classes of two co-educational schools randomly sampled for the study. A simple random sampling technique was used to select two co-educational secondary schools in Minna. Thereafter, the sampled schools were randomly assigned to experimental and control groups. The experimental group consists of eighty five (85) SSII students and was taught with instructional material (improvised phases of mitosis). Control group on the other hand consists of seventy (70) SSII students and was taught without instructional materials (improvised phases of mitosis).

Two different instruments used for the study are: (i) Treatment instrument and (ii) Test instrument. Treatment instrument was the lesson plan used by

the researcher to teach the students the concept of mitosis during the study. Lesson plan for the experimental group involved the use of improvised instructional material (improvised phases of mitosis) while that of the control group does not involve the use of improvised instructional material. Test instrument was Biology Achievement Test (BAT) developed by the researcher based on SS II Biology curriculum on the concept of mitosis. BAT contains twenty five (25) questions each with four options (A-D) and only one of the options was correct. Validity of the instrument was conducted by three experts. The BAT was pilot tested and reliability of 0.82 was obtained using test-retest technique. BAT was used to collect data as pretest and posttest from both experimental and control groups

Treatment instrument was the instructional material (improvised phase of Mitosis) also developed by the researcher and used on the experimental group while conventional instructional method was used on the control group (without instructional material). Treatment

instruments were also validated by experts to determine their appropriateness on the group of students they were developed to be used on. Experimental group students were taught the concept of Mitosis in Biology using improvised instructional material (improvised phase of Mitosis) while the control group students were taught the same concept using conventional teaching method (without instructional materials). At the end of the treatment, Biology Achievement Test BAT was administered on the students of both groups. The data obtained (pretest and posttest scores) from the study were analyzed using mean, standard deviation and t-test statistic.

Results and Discussion

Research Question One: What is the difference between the mean achievement scores of students taught the concept of Mitosis in Biology using Improved Instructional Materials and those taught with Lecture Method?

Table 1: Mean and Standard Deviation of Achievement Score of Experimental and Control Groups

Group	N	Mean (\bar{X})	SD	Mean Diff.
Experimental	85	70.22	10.44	8.34
Control	70	61.88	9.59	

Table 1 shows Mean achievement score and Standard Deviation of Biology students taught Mitosis using improvised instructional materials and those taught using lecture method. The table revealed that, experimental group had a Mean achievement score of 70.22 with Standard Deviation of 10.44 and control group had Mean achievement score of 61.88 with Standard Deviation of 9.59. The mean difference is 8.34 in favour of the experimental group. This revealed

that improvised instructional materials have enhanced the experimental group students' achievement higher than the lecture method.

Research Question Two: What is the difference between the gender mean achievement scores of students taught the concept of Mitosis in Biology using Improved Instructional Materials?

Table .2: Mean and Standard Deviation of Achievement Score of Male and Female Students in Experimental Group

Gender	N	Mean (\bar{X})	SD	Mean Diff
Males	44	66.65	10.73	0.04
Females	41	67.05	10.98	

Table 2 shows Mean achievement score and Standard Deviation of secondary school Biology male and female students taught Mitosis using improvised instructional materials and those taught using lecture method. The table revealed that, male students had Mean achievement score of 66.65 with Standard Deviation of 10.73 and female students had Mean achievement score of 67.05 with Standard Deviation of 10.98. The mean difference is 0.40 in favour of female students but the difference is not significant. This revealed that improvised instructional materials enhanced both male and female students' achievement equally.

Testing of Hypotheses

Ho₁: There is a significant difference between the mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials and those taught with Lecture Method. To test this formulated hypothesis, independent t-test was used and the analysis presented in Table 3

Table 3: t-test Analysis of Mean Achievement Scores of Experimental and Control Groups

Group	Group	N	Df	\bar{X}	SD	t-value	P-value
Pre-Test	Experimental	85	153	41.33	8.55	0.77	0.12 ^{NS}
	Control	70		43.25	8.59		
Post-Test	Experimental	85	153	70.22	10.44	0.89	0.00*
	Control	70		61.88	9.59		

* - Significant at 0.05,

Table 3 shows the t-test analysis of pretest of experimental and control group (t - value = 0.77, df = 83, P - value = 0.12 & P > 0.05) was not significant. This indicates the students' entry knowledge of students about Mitosis is equal before the treatment. The posttest of the experimental and control group (t - value = 0.89, df = 83, P - value = 0.00 & P < 0.05) was significant. This implies that the use of Improvised Instructional Materials to teach students Mitosis in Biology has enhanced their academic achievement

compared to those taught using lecture method as such, hypothesis one was rejected.

Ho₂: There is no significant difference between the gender mean achievement scores of students taught the concept of Mitosis in Biology using Improvised Instructional Materials. To test this formulated hypothesis, an independent t-test was used and the analysis presented in Table 4

Table 4: t-test Analysis of Mean Achievement Scores of Male and Female Students in Experimental Group

Group	Gender	N	Df	\bar{X}	SD	t-value	P-value
Post-Test	Male	44	83	66.65	10.98	0.82	0.56 ^{NS}
	Female	41		67.05	10.73		

NS Not Significance at 0.05

Table 4 shows the t - test analysis of mean achievement scores of male and female students in the experimental group (t - value = 0.82, df = 83, P - value = 0.56 & P > 0.05). This means the result is not significant. This implies that using Improvised Instructional Materials to teach

students Mitosis in Biology enhanced gender achievement equally as such, hypothesis two was not rejected.

Summary of Findings

1. The study that revealed that improvised instructional materials had a significant effect on students' achievement hence, experimental group achieved higher than control group.
2. The study revealed that improvised instructional materials have no significant gender effect as both male and female students in experimental group achieved equally.

Discussion

This study established that improvised instructional materials enhanced students' achievement better than lecture method. This finding is in agreement with the finding of Adeyemi and Olayeye (2010) who investigated the effect of students involvement in production of instructional material on their academic achievement in Biology and they reported a significant difference between students taught biology without instructional materials and those taught using locally produced instructional materials. Similarly, the finding is in agreement with the finding of Oladejo *et al.*, (2011) who carried out a study on instructional materials and students' academic achievement in physics. They reported that, students taught with improvised instructional materials had the highest achievement score at posttest, followed by those with standard instructional materials, while the control group scores the lowest. The finding shows that there is significant difference in the achievement scores of students taught using improvised instructional materials, standard materials and conventional method. This might be due to the fact that improvised instructional material used was produced from the local materials the students are already familiar with.

The study also established that improvised instructional materials affected both male and female students' achievement equally as there was no significant gender difference observed. This finding is in line with the findings of Ogunleye and Babajide (2011) who found no significant difference between the performance of male and females. But, the finding was in disagreement with the findings of Adeyemi and Olayeye (2010) who carried out a study on effect of student involvement in the production of instructional materials on academic achievement in biology and reported a

significant difference in the posttest achievement scores of male and female students taught biology using instructional materials.

Based on the findings of this study, it is concluded that students taught Mitosis with the use of improvised instructional materials (experimental group) achieved higher than their counterpart taught same concept (Mitosis) using the lecture method. There was no significant difference in gender achievement of students taught Mitosis with improvised instructional materials. Therefore, the use of improvised instructional materials has enhanced the teaching and learning of the concept of Mitosis in biology.

Recommendations

From the findings of this study, the following recommendations were made

1. The biology teacher should make use of different and relevant local materials for improvisation so long as they are relevant to the content to be taught.
2. Biology teachers should be resourceful in material selection and planning in order to reduce the cost of improvisation and maintenance of improvised instructional materials.
3. Government should try to provide funds to secondary school biology teachers to be enable to improvised the necessary instructional materials for teaching
4. Stakeholders in education should organise in service training, seminar, workshops conference on how to improvise the instructional materials for biology teachers so as to bring about effective and meaningful teaching and learning.

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