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EFFECT OF USING INSTRUCTIONAL MATERIALS IN ENHANCING TEACHING AND LEARNING OF MATHEMATICS IN JUNIOR SECONDARY SCHOOLS IN OBIO-AKPOR LGA OF RIVERS STATE

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Abstract

This study was designed to examine the effect of using instructional materials in enhancing teaching and learning of Mathematics in junior secondary schools four research questions and two hypotheses were formulated to guide the study. The study adopted quasi experimental pretest, posttest control group design was used for the study .Eighty (80) students (40 males and 40 females)randomly selected from two Junior public secondary schools were used for the study. The stratified sampling technique was used for the study. The participants in the experimental group were taught using numbers and numeration using flipped classroom method while the control groups were taught using traditional lecture and assignment method. The students were randomly assigned to the experimental group and control groups respectively. Effect of instructional material on Mathematics assessment scale (EIMMAS). This was a 20 – item assessment scale structured in four points Likert scale of strongly agree (4 points), Agree (3points), disagree (2 points), strongly agree (1 point). Test re-test method was used to determine the reliability of the instrument which yielded a coefficient of 0.84.The data collected were analyzed using mean, standard deviation and t-test statistics. Data collected was analyzed using descriptive statistical method including mean, standard deviation and t-test. The analysis indicated that instructional material enhanced learning; it also revealed no gender effect on treatment. Based on these findings, it was recommended that government should provide enough instructional materials for the schools to enable teachers teach with ease. Teachers and administrators should attend seminar and workshops in order to know and be able to utilize available resources.

Key words: *Effect , Mathematics, Instructional material, Junior secondary school, teaching and learning*

Introduction

Teaching effectively is an indispensable tool to which no cost can be justifiably attached to its values. Teaching/learning would have remained relatively barren if instructional materials are not used. Education is the greatest legacy one can bequeath the younger generation. Like a precious

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money material, education is generally acceptable and durable. There is no other tested way one can excel in any given field of human endeavor except by the evergreen route of education. A youth without an education is like an untrimmed and unkempt flower plant. Education changes an individual for life. It is unwholesome to rebuff, disregard and underestimate the importance of teaching with instructional materials to enhance students' academic performance. Teaching when carefully interwoven with instructional materials leads to total life of excellence, efficiency and effectively. Taking active part of imbibing instructional materials will bring transformation in teaching/learning of Mathematics. It is a clarion call to all the teachers to do their best for the success of their jobs. Mathematics is a compulsory subject that must be credited by students before gaining admission into any tertiary institution especially the university to study any relevant courses such as Medicine, Engineering, Accountancy, Business Administration, Management, Economics, Science and others. Ajoku in Dienye and Asuru (2012) described instructional materials as carriers of information from one transmitting point to another. They result in more effective learning of factual information and skills in less time than mere verbalization. Instructional materials include visuals, audio as well as audio-visual materials. Thus they include illustratedtexts,pictures,photographs,diagrams,flashcards,models,charts,graphics,realobjects,specimens,textbooks,slides, filmstrips and transparencies. Instructional materials also known as teaching/learning materials (TLM) are any collection of materials including animate and inanimate objects and human and non-human resources that a teacher may use in teaching and learning situations to help achieve desired learning objectives. Instructional materials may aid students in concretizing a learning experience so as to make learning more exciting, interesting and interactive. They are tools used in instructional activities, which include active learning and assessment. The term encompasses all the materials and physical means an instructor might use to implement instruction and facilitates student's achievement of instructional materials. From all indications, it can be concluded that teaching materials are the tools which the teacher can use to help the students learn concept with easy and efficiency through visual and audio such as power point presentations, textbooks, articles, manipulatives, reference, lesson plans, workbooks, flipped classroom ,flashcards etc

According to Amadioha (2009), Instructional materials are substitutable with 'teaching aids. Instructional materials comprise alternative channels of communication, which a teacher can use to convey more vividly instructional information to learners. They represent a range of materials which can be used to 'extend the range of vicarious experience' of learners in a teaching-learning. Instructional materials refer to those alternative channels of communication, which a classroom teacher can use to concretize a concept during teaching and learning process. Traditionally, classroom teachers have relied heavily on the 'talk-chalk' method during their teaching but recently, instructional materials help to provide variations in the ways in which messages are sent across. In using instructional materials teachers and students do not only extend the range of sense organs they use but also extend the range of materials used for convening the same message through the same organ. For instance, in teaching a topic a teacher can manipulate

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real objects or use their stimulators. Instructional materials therefore constitute the media of exchange through which a message transaction is facilitated between a source and a receiver.

Qualities of good Instructional Materials

According to Dienye and Asuru (2012) the following are qualities of good instructional materials:

i.Simplicity:-Materials selected for use in any communication setting must not be complex but simple, concise and relevant to the behavioral objectives of the stated lesson.

ii.Attractiveness:-It helps to stimulate and sustain learners' interest in any lesson taught

iii.Relevance:-Any instructional material meant for a particular lesson must be useful and direct to the topic. Any shortcomings become a predicament to the disadvantage of the learner, as these would no longer promote the lesson objective.

iv.Legibility:-This has to do with clearly distinguished writings and labeling. Handwritings should be clearly defined as the opposite may distort the language and message.

v.Durability:-Prepared materials to meet a teaching-learning situation should be able to stand the test of time. This is because students in most cases use them to demonstrate to fellow classmates, and they may understand better when the teacher may be away.

Samra and Rajani in John (2016) indicated that a number of learners finish education without acquiring essential skills that are needed in life. Indeed it is an indication that increase in number of student has been prioritized over the number and quality of instructional materials. Hakelimu et al., in John (2016)reported that teaching in Community secondary school is dealing with people living in poverty as these schools lack necessary teaching facilities such as furniture for staff and students, books, science equipment, games and sport equipment (Benell &Mukyanuzi in John, 2016).Furthermore, teachers lack essential skills to make quality teaching and learning aids. Obioha (2006) and Ogunleye (2002) reported that there were inadequate resources for teaching Mathematics subject in Secondary Schools in Nigeria. They further stated that the available ones are not usually in good condition. Therefore there is need for improvisation.

Effiong et al., (2015) summarized the role of teaching aids as follows:

- It promotes meaningful communications, and effective learning,
- They ensure better retention, thus making learning more permanent,
- They help to overcome limited classroom by making the inaccessible accessible.
- They provide a common experience upon which learning can be developed,
- They stimulate and motivate students to learn and
- They encourage participation especially if students are allowed to manipulate the materials used.

and flipped classroom, instructional materials promotes creativity and removes anxiety.

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Statement of the Problem

Experiences have shown that most Secondary School teachers are knowledgeable enough in applying instructional materials during their teaching in order to boast student interest in learning but some know the effect of using instructional materials but treats it with levity thereby making their learning to be boring, uninteresting. As a result of this, students disdain mathematics seeing it as a subject that is difficult to learn .

Research Questions

1. What is the effect of instructional materials on experimental and control groups in the pretest scores of junior secondary students as measured by their mean scores?
2. What is the effect of instructional materials on experimental and control groups in the posttest scores of junior secondary students as measured by their mean scores?
3. How does an instructional material enhance male/female students exposed of junior secondary students with instructional materials?
4. There is no significant difference between the experimental and control groups in the post-test scores of junior secondary students with instructional materials.
to flipped classroom method as measured by their mean?

Hypotheses

H_{01}. There is no significant difference between the experimental and control groups in the pretest scores

H_{02}. There is no significant difference in enhancing the learning of male and female students exposed to flipped classroom method.

Methodology

Experimental research design was adopted for this study. It consisted of two groups – one treatment and one control. Treatment group was taught using instructional materials while control group was taught without instructional materials. The two groups were randomly selected.

Population of the Study

It consists of all Junior Secondary School (JSS 3) students in Obio/Akpor Local Government Area of Rivers State.

Sample and sampling techniques

The researcher made use of sample size of eighty students from each of the two (2) comparable public Secondary Schools randomly selected for the study using simple random sampling technique. The selected class was made up of 40 males and 40 females. The same procedure was also used for the control group.

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Instrument for Data Collection

The instrument used for this study was Effect of instructional material on Mathematics assessment scale (EIMMAS). This was a 20 – item assessment scale compiled and prepared by the researcher. It was structured in four points Likert scale of strongly agree (4 points), Agree (3points), disagree (2 points), strongly agree (1 point). It was validated by three experts of measurement and evaluation in Imo State University. Their suggestions were reflected in the modified version of the instrument. Test re-test method was used to determine the reliability of the instrument which yielded a coefficient of 0.84.The data collected were analyzed using mean and t-test statistics.

Results

Research Question 1: What is the effect of instructional materials on experimental and control groups in the pretest scores of junior secondary students as measured by their mean scores?

Table 1: Means and standard deviation analysis of pretest for two groups.

Group	N	Mean	SD
Experiment	40	14.43	2.92
Control	40	14.35	3.13

The result in Table1 shows that the effect of instructional materials on experiment (14.43) was higher than that of their control (14.45). It is an indication that experiment group was more effective than control group.

Hypothesis I H_{01}**:** .There is no significant difference between the experimental and control groups in the pretest scores of junior secondary students with instructional materials.

Table 2: t- test analysis of pretest mean scores of the experimental and control groups.

Group	**N**	**Mean**	**SD**	**DF**	**t-cal**	**t-critical**	**Results**
Experiment	40	14.43.	2.92	39	0.24	2.021	Not Significant
Control	40	14.35	3.13				

The result in Table 2 shows no significant difference at 0.05 level of significance between the pretest mean scores of the experimental and control groups (calculated t-value (0.24) is less than the critical t- value (2.021) at df =39 and .05 level of significance. The null hypothesis was accepted. This is an indication that participants in the experimental and control groups were the same entry level with regard to the enhancing teaching and learning with instructional materials.

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Research Question 2: What is the effect of instructional materials on experimental and control groups in the posttest scores of junior secondary students as measured by their mean scores?

Table 3: Means and standard deviation of posttest for two groups.

Group	N		SD
Experiment	40	68.95	5.99
Control	40	58.90	5.38

The result in Table 3 shows that the effect of instructional materials on experiment (68.95) was higher than that of their control (58.90). It is an indication that experiment group was more effective than control group.

Hypothesis 2. There is no significant difference between the experimental and control groups in the post-test scores of junior secondary students with instructional materials.

Table 4: t- test analysis of pretest mean scores of the experimental and control groups.

Group	**N**	**Mean**	**SD**	**Df**	**t-cal**	**t-tab**
Experimental	40	68.95	11.09	39	15.74	2.02
Control group	40	58.90	15.31			

The result in Table 4 shows a significant difference at 0.05 level of significance between the posttest mean scores of the experimental and control groups (calculated t-value (15.74) is greater than the critical t- value (2.02) at df =39 and 0.05 level of significance. The null hypothesis was rejected. This is an indication that participants in the experimental and control groups were the same entry level with regard to the enhancing teaching and learning with instructional materials.

Research Hypothesis 2 H_{02} **:** How does an instructional material enhance male/female students exposed to flipped classroom method as measured by their mean?

Table 5: Posttest mean –scores and standard deviation analysis of students exposed to flipped classroom by gender

Group	N	Mean	SD
Male	20	68.70	6.27
Female	20	69.20	5.75

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The result in Table 5 shows how does instructional materials enhance male and female students exposed to flipped classroom method (68.70) was higher than that of their control (69.20). It is an indication that female students' exposures are more effective than their male counterparts.

Hypothesis 3: There is no significant difference in enhancing the learning of male and female students exposed to flipped classroom method

Group	N	Mean	SD	Df	t-cal	t-tab
Male	20	68.70	6.27	19	0.31	2.02
Female	20	69.20	5.75			

The result in Table 6 indicates that the there was no significant difference between the post-test mean scores of male and female participants in the experimental group at 0.05 level of significance (t-cal=0.31,d.f=19,P < 0.05).Therefore hypothesis 2 was accepted. The male and female students taught with flipped classroom model were enhanced.

Discussion

The followings were the highlights of the findings based on the research hypothesis formulated for the study. The result of research one findings revealed that those taught with experimental groups had higher mean score (14.43) than those that did not receive treatment (14.35) which indicates that instructional materials enhances teaching and learning. This finding is in support with (Nwike & Onyejegbu, 2013) and also in collaboration by Esu et al., in Chong (2016) who says that teaching aids are an important tool that makes teaching and learning activities successful. The finding of hypothesis two shows significant difference between the experimental and control groups in the post-test scores of junior secondary students with instructional materials. This confirms that treatment given had an effect on the enhancement of teaching/learning. The findings agreed with Atanda and Taiyeoba in Chong (2016) which says availability and adequacy of instructional materials enhance effective learning and better performance of students. The finding of hypothesis two (2) shows a significant difference in enhancing the learning of male and female students exposed to flipped classroom method The findings of study shows that male students had a higher mean score than the female students. It is an indication that when students are taught without the use of instructional materials, the tends to perform lower than when not used. This finding is in line with the opinion of Nzeneri (2005) and Mba which states that inadequate use of instructional materials could be responsible for poor students' performance which may likely lead to dropout among the students.

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Conclusion

From the findings of this research work, the following conclusions were drawn:

1.Teacher's instructional material employed in teaching Mathematics at Junior Secondary School has significant effects on enhancing teaching/learning. The findings showed that application of instructional materials will stimulate teaching.

2.The male and female students were affected positively and equally by the use of instructional materials in teaching Mathematics and the effect of instructional materials are not gender dependent.

Recommendations

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

1.Instructional materials should be used at the appropriate time.

2.Curriculum planners, stakeholders, to emphasis the efficacy of instructional materials.
3.Government should provide enough instructional materials for the schools to enable teachers teach with ease.
4.Teachers and administrators should attend seminar and workshops in order to utilize available resources.

5.Instructional materials should be made compulsory for all the teachers because without it, teaching-learning process will be like a tea without sugar or food without salt.

6.Teachers should intensify effort to improvise materials either in the school environment or outside to stimulate their learning where school fails to provide.

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