EFFECTS OF INSTRUCTIONAL MATERIALS (COMPUTER) IN PROMOTING SECONDARY SCHOOLS STUDENTS' ACADEMIC PERFORMANCE IN COMPUTER SCIENCE IN KEBBI STATE, NIGERIA

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Abstract: -

The study examined the effects of instructional materials in promoting secondary schools students' academic performance in computer science in Kebbi State, Nigeria. Quasi experimental with a pretest and post-test, non-equivalent comparison design was adopted. Purposive sampling was used to select two JSS3 intact classes of 31 and 34 students from Government Girls Secondary School Birnin Kebbi and Salamatu Hussaini Girls Secondary School Birnin Kebbi as experimental and control groups respectively to participate in the study. An instrument titled Computer Science Achievement Test (CSAT) was validated by experts and reliability co-efficient of 0.93 was obtained using Kuder Richardson 21 (KR-21). The instrument was used for the pretest and posttest. Two research questions were answered and the hypothesis formulated was tested at 0.05 level of significance. Data were analyzed using mean and z-test. Findings revealed that there was significant difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction. In favor of the experimental group (those taught using instructional material (computer)), thus instructional material was found effective. It was recommended among others that education board should commit itself to providing relevant and economically enhanced instructional materials to secondary schools and more computers should be provided to schools for effective delivery in the teaching of computer science in secondary schools.

Keywords: - *Instructional materials, computer science, teaching and learning.*

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Computer science as a subject has become one of the most fast growing and far-reaching developments in Nigeria secondary schools. It is a subject through which students are taught the rudiments of using the computer to store and process data/ information accurately and efficiently (Okebukola, 1990). The process seeks to equip the students with skills and knowledge that can make him/her use the computer effectively (Adamu & Bello, 2002). Effective teaching of computer science requires the use of realia or virtual realia (instructional materials). In this modern age, teaching is supported by technologies (instructional materials) such as multimedia projectors, interactive whiteboards, 3 dimensions display devices, among others. Instructional materials refer to anything a teacher uses in teaching and learning situation from small stones, pieces of papers, small sticks, sample of leaf, chalk board, maps, charts, radio, television, computers, and so on (Abdullahi, 2005).

Instructional materials are vehicles that convey messages/information from transmitting sources which may be human or non-human to the receiving end (students/learners). Instructional materials are prerequisites to effective teaching and learning process as it supports learner active participation. In Nigeria, most of the secondary schools are faced with problem of non-availability or inadequacy of instructional materials and to some extent its improper utilization. It is often debated by experts that even where the instructional materials are available, their utilization for effective teaching and learning has been put in commas. Hence the need to investigate the effects of instructional materials on secondary schools students' academic performance in computer science in Kebbi State, Nigeria.

Concept of Instructional Materials

Instructional materials are materials which assist teachers to make their lessons explicit to learners, they are devices which present a complete body of information and largely self-supporting rather than supplementary in teaching and learning (UNESCO, 2015). Instructional materials include all forms of information device which both teacher and learner can refer to use as sources to obtain knowledge, new idea and to acquire new skills and competencies (Audu, 2002). Instructional materials include all materials including instruments and resources that aid the teacher in realizing his/her objectives in the teaching-learning process. These include textbooks, charts, improvised workbook and so on (Ifeoma, 2013).

Instructional materials are information corners designed specifically to fulfilled objective in the teaching and learning situation (Reiser, 2001). Azare (2005) posits that for effective teachinglearning process, teachers most make an active use of instructional materials. Instructional materials are important because they are used for the transference of information from one individual to another, help the teacher in extending his learner's horizon of experience, stimulate learners' interest and help both teachers and students to overcome physical limitations during the presentation of subject matter, among others (Agbulu & Wever, 2011). Instructional materials are materials or tools locally made or imported that could made tremendous enhancement of lesson impact if intelligently used (Isola, 2010). They are objects or devices, which help the teacher to make a lesson much clearer to the learner. Instructional materials are didactic materials things which are supposed to make learning and teaching possible. They can also be defined as materials or tools locally made or imported that could make tremendous improvement of a lesson if intelligently used (Wambui, 2013). Instructional materials are said to be objects or things the teacher can use in the classroom while teaching in order to ease off his/her teaching activities.

Instructional materials are also described as concrete or physical objects which provide sound, visual or both to the sense organs during teaching (Agina-Obu, 2005). Instructional materials are in various classes, such as audio or aural, visual or audiovisual. Thus, audio instructional materials refer to those devices that make use of the sense of hearing only, like radio, audio tape recording, and television. Visual instructional materials on the other hand, are those devices that appeal to the sense of sight only such as the chalkboard, chart, slide, and filmstrip. An audio-visual instructional material however, is a combination of devices which appeal to the sense of both hearing and seeing such as television, motion picture and the computer. Among the instructional materials the classroom teacher uses, the visuals out-numbered the combination of the audio and audio-visual (Oladejo, Olosund, Ojebisi & Isola, 2011).

The place of instructional materials in the effective implementation of any education programme cannot be under-mined. Instructional materials perform such functions as the extension of the range of experience available to learners, supplement and complement the teacher's verbal explanations thereby making learning experience richer and providing the teacher with interest into a wide variety of learning activities. Instructional materials supplement, clarify, vitalize, emphasize instruction and enhance learning in the process of transmitting knowledge, ideas, skills and attitude. This calls for teacher's resourcefulness and improvisation on the parts of the Physics teachers. The ability of the teacher to make use of local materials in place of standard ready-made materials makes lesson more effective and improved students' achievement (Oladejo et al., 2011).

Instructional materials are essential and significant tools needed for teaching and learning of school subjects to promote teachers' efficiency and improve students' performance. They make learning more interesting, practical, realistic and appealing. They also enable both the teachers and students to participate actively and effectively in lesson sessions. They give room for acquisition of skills and knowledge and development of self- confidence and self- actualization (Olayinka, 2016). Instructional materials are visual and audio-visual aids, concrete or non-concrete, used by teachers to improve the quality of teaching and learning activities in Social Studies (Fadeiye, 2005). Instructional materials are tools used by teachers to aid explanations and make learning of subject matter understandable to students during teaching learning process (Oluwagbohunmi & AbduRaheem, 2014). Instructional materials are intermediary or mediating materials used in instruction or teaching learners so as to make the learning objectives clearer and teaching easier. A watchful explanation of a subject may not absolutely lead to a better understanding of that particular subject matter, whereas, the use of instructional materials provides clarity on issues that are of learning interest to the learners (Ezimah, 2004).

Effective use of Instructional Materials and Students' Academic Performance

Utilization is the method by which asset performance is measured and business determined. It is the transformation of a set of input into goods or services (Daudu, 2012). It involves creation of value in things. Utilization of instructional materials depends on their availability in the school.

The term 'utilization' is the same thing as 'using' as explained in the 2008 definition of educational technology by the Association of Educational and Communication Technology (AECT, 2008). Utilization of instructional materials is a tool and strategies for improving teacher professional development for effective service delivery (Nwosu, 2010). Based on the meaning given to utilization, it has been observed that mastery of subject matter might not be fully achieved without the use of instructional materials. As such, teaching without instructional materials may certainly result in poor academic achievement.

When students' academic performance for ten years was studied in relation to the use of instructional materials in Kwara State, Isola (2010) established that there was a strong correlation between the utilization of instructional materials and students' academic performance in many subjects. Oladejo et al., (2011) asserted that there is a significant difference in the academic performance of students taught Physics using standard instructional materials, those taught with improvised instructional material and those in the conventional instruction. Where those taught using standard instructional materials performed better than those taught using conventional instruction. Non availability and inadequacy of instructional materials are major causes of ineffectiveness of the school system and poor performance of students in schools (Abdu-Raheem, 2011).

In most secondary schools in Nigeria, teaching and learning take place under a most un-conducive environment without access to essential materials. It is very important to use instructional aids for instructional delivery to make students acquire more knowledge and to promote academic standard (Eniayewu, 2005). Instructional materials help teachers to teach conveniently and the learners to learn easily without any problem and they have direct contact with all sense organs (Olumorin, Yusuf, Ajidagba & Jekayinfa, 2010). Effective teaching and learning requires a teacher to teach the students with instructional materials and use practical activities to make learning more vivid, logical, realistic and pragmatic (Akinleye, 2010). It has been established by Olayinka (2016) that students taught with instructional materials have excellent achievement scores compared with those taught without any material. She further affirmed that importance of instructional materials in the development of learners' intellectual abilities and attainment of teaching/learning objectives cannot be over emphasized. There is statistical significant difference in the academic performance of students taught with instructional materials than those not taught with them (Ifeoma, 2013). It also established that the use of instructional materials such as workbooks improved the quality of learning in the students.

Instructional materials stimulates and helps learners to take active interest in the topic presented, development of emotional impact of the learners and affect their attitude towards what is portrayed. The usefulness of these materials depends on what the facilitators make out of them (Mba, 2004). Unless the facilitators use these materials and direct learners attention to what they should look for, the learners will not learn as intended from such materials. Instructional materials result in more effective learning of actual information in less time than voicing (Iyunade, 2014). For an effective teaching-learning process, instruction must be properly planned and designed in a systematic way and that, the steps to instructional design models must include; (a) identifying the purpose of instructions; (b) developing the instruction; (c) selecting the strategy; and (d) evaluating the effectiveness of instruction (Akude, 2004). Instructional materials help make learners understand abstract ideas and complex topics. The comparative efficiency of instructional materials in teaching learning is evident in its potentials of bridging the gap in communication between the instructors and learners. Thus, the learning ability of the learner is better reinforced with the use of instructional materials (Iyunade, 2014).

Instructional materials which are related to the basic activity of a lesson helps in in-depth understanding of such a lesson by the learners, in that it makes the lesson attractive to them, thereby arresting their attention and thus, motivating them to learn and participate. Participation helps teachers to discover their learners' potential, to realize their talents and raise their self-esteem. In turn this can help them to question their boundaries and explore issues, voice aspirations, identify needs and facilitate their learning and personal development (Clark, Kjørholt, & Moss, 2005). Instructional materials serve functions of enhancing retention which makes learning more permanent. Equally, they stimulate and sustain interest in learning by providing first-hand experience with the realities of the physical and social environment (Allen, & Hart, 2008). Teaching aids must be appropriate to situationally determined and individually responsive preparation and preview: For effective and successful use of teaching aid for proper teaching/learning situation, the teacher must in advance prepare himself, the learners, the environment and the materials as a matter of must should be previewed by the teacher in order to follow its process of presentation sequentially (Wambui, 2013).

Computer Science and Utilization of Instructional Materials

Computer is conceived as a device or machine designed especially to perform calculations, process data and store information which can be easily retrieved when required (Adamu & Bello, 2002). Some factors that led to inefficiency in teaching and learning computer science in secondary schools include: inadequate professionally trained computer science teachers, inadequate computers, lack of support infrastructural facilities, inadequate instructional materials, general students apathy and indifference in computer science, lack of motivation and encouragement for students and lack of incentive and motivation for teachers (Ehondor & Omoruyi, 2013).

Computer science being a new subject in the secondary school curriculum needs to be given due recognition because of its unquantifiable significance to the entire world (Suberu, 2013). Inadequate funding; lack of instructional materials; maintenance and power supply are the major factors affecting effective teaching of computer science in secondary schools

(Suberu, 2013). Teaching computer science as a subject in Nigerian secondary schools helps students to develop competence in the basic skills and understanding of dealing with computers; helps to develop the habit of analytical data base concept; helps to effectively utilize the computer in solving problems; helps to develop necessary background in computer science to enhance further education; helps to create a technological based education at the secondary school level among others (Fisusi, 2000).

Purpose of the Study

The main purpose of this study was to ascertain the effects of instructional materials on secondary schools students' academic performance in computer science in Kebbi State, Nigeria. Specifically, the study aimed to:

- i. Determine whether there is a difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction.

Research Question

The following research questions were raised to guide the study:

- i. What is the effect of teaching computer science with instructional material (computer) in terms of academic performance compared to those taught using traditional method?
- ii. Is there difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction?

Null Hypothesis

Based on research question 2, the following null hypothesis was formulated:

H_{01} There is no significant difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction.

Methodology

A quasi experimental with a pretest and post-test, non-equivalent comparison design was adopted. In this design, two groups were involved (experimental and control). Where the experimental group was taught using instructional material (computer) and control group taught using conventional instruction. The two groups were post-tested to determine the effect of the instructional material (computer) used in teaching those in the experimental group. All the secondary school students from Kebbi State formed the population of the study. Government Girls Secondary School Birnin Kebbi and Salamatu Hussaini Girls Secondary School Birnin Kebbi formed the target population. JSS3 students (intact classes) from the two schools were purposively selected to represent the experimental and control groups respectively. The schools were selected based on facilities and manpower, school type (public schools), gender composition (girls' schools). An instrument pegged Computer Science Achievement Test (CSAT) was validated by experts and reliability co-efficient of 0.93 was obtained using Kuder Richardson 21 (KR-21).

Data Analysis and Results

This section dealt with the analysis of the data obtained and presentation of results.

Table 1: Pretest Mean Scores for the Experimental and Control Groups

Group	N	Mean	Std. Deviation
Exp.	31	7.29	2.584
Cont.	34	6.91	2.667

From table 1, pretest mean for the experimental and control groups were respectively 7.29 and 6.91. The disparity of 0.38 between the two mean shows that the difference is statistically insignificant. This indicates that the groups were selected on the same benchmark.

Research Question1: What is the effect of teaching computer science with instructional material (computer) in terms of academic performance compared to those taught using traditional method?

Table 2: Pretest and Post-test Mean Gain scores for the Experimental and Control Groups

Group	N	Pretest	Post-test	Mean Gain scores
Exp.	31	7.29	11.35	4.06
Cont.	34	6.91	9.71	2.08

Table 2 shows that the mean gain scores of 4.06 and 2.08 for the experimental and control groups respectively. The higher mean gain score of 4.06 indicates that teaching with instructional material (computer) was more effective than teaching using traditional approach.

Hypothesis Testing

H₀₁: There is no significant difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction

Table 1: z test on the Academic Performance of experimental and control groups

Groups	N	Mean	Variance	z	p	Remark
Exp.	31	11.35	8.30	1.96	0.01	Sig.
Cont.	34	9.71	5.22			

Table 3 shows the result of z-test in respect of the null hypothesis. The mean score for the experimental and control group were respectively 11.35 and 9.71, while the variance for the two groups were 8.30 and 5.22 respectively. The z-test result 1.95, $p < 0.05$ (two tailed) revealed that there was significant difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction. In favor of the experimental group (those taught using instructional material (computer)). Thus the null hypothesis was rejected.

Discussions

Finding from table 2 indicated that teaching with relevant instructional materials was effective in promoting students' academic performance in computer science. This finding was affirmed by the finding of Aniyewu (2005) who asserted that instructional materials make teaching-learning process more authentic and effective which in turn reflects on students' academic performance. The finding also does not contradict the assertion made by Olayinka (2016) that students taught with instructional materials have exceptional achievement scores compared with those taught without any material. From the hypothesis tested, it was found that there was a significant difference in the academic performance of the students taught using instructional material (computer) and those taught using conventional instruction. Where those taught using instructional materials performed significantly better. This was confirmed by the Ifeoma (2013) when she established that there was a statistical significant difference in the academic performance of students taught with instructional materials than those not taught with them. The finding is also in line with the statement that instructional materials help motivate students to actively participate for the attainment of their educational goals (Clark et al., 2005). It does not contradict the finding that misuse of instructional materials leads to students' poor academic performance in schools (Abdu-Raheem, 2011). So also, the finding supports the assertion made by Oladejo et al., (2011) that there is a significant difference in the academic performance of students taught Physics with standard instructional materials and those taught using conventional instruction, in favor of those taught with standard instructional materials.

Conclusion

Teaching with relevant instructional materials is an exceptional one, going into any class without these materials is a problem on its own. In the teaching of computer science, instructional materials perform such functions as addition to the series of experience available to learners, add-on to the teacher's voiced explanations thereby making learning experience better-off and providing the teacher with interest into an extensive variety of learning activities.

Recommendations

Based on the findings of this study, it is recommended among others that:

1. Education board should commit itself to providing relevant and economically enhanced instructional materials to secondary schools.
2. Schools managements should ensure effective and efficient utilization of instructional materials available to them.
3. More computers should be provided to schools for effective delivery in the teaching of computer science in secondary schools.

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