

Synchronized Multimedia on Motivation and Academic Performance of Students

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Abstract Multimedia [MM] materials and equipment are instructional materials which teachers and trainers use as alternative means of communication to transmit curriculum content to the learner. MM combines two or more different types of instructional materials at the same time in a presentation. They have synchronization potentials and can be effectively used to facilitate teaching and learning process, arouse learners' interest, support and reinforce students learning, influence better academic performance in learners, aid mastery learning, among other things. This paper presents the results of research studies carried out to determine the effect of synchronized MM use on motivation and academic performance of students in Biology. Pearson product correlational analysis indicated lack of correlation between use of synchronize MM and students' motivation while t-test indicates significant difference between biology students who were taught with synchronized MM (mean score, 51) and the control group (mean score, 23). The control group who were taught the same Biology devoid of synchronized MM package performed poorly. We recommend that there is need for government to provide multimedia in secondary school and the biology teachers to make transition to use modern MM devices and adopt different approaches for biology instruction and laboratory activities rather than the traditional or conventional talk-chalk method.

Keywords: biology, synchronized, multimedia, motivation, academic performance

Introduction

Science (and Technology) education is the foundation for sustainable national development by protecting human societies from ignorance, illiteracy, disease and poverty (Tandi, 2009). The teaching of biology starts from Nursery through primary to secondary and tertiary institutions and is the basis for such courses as medicine, biochemistry, microbiology, zoology, botany and even environmental sciences. Biology education is meant to expose the learners to biological nature (facts, principles and concepts), processes and attitudes and then equip them with skills of a professional biology teacher. The objectives of the biology curriculum as provided in the National Policy of Education (FME, 2004) include:

- Adequate laboratory and field skills in biology
- Meaningful and relevant knowledge
- Ability to apply scientific knowledge to everyday life on matters on personal and community health and agriculture;
- Reasonable and functional scientific attitudes.

Teachers who are the implementers of the curriculum have a sacred duty in ensuring that the biology students attain the above goals. Incidentally, the learners have their peculiar characteristics which may manifest special learning needs (Elliot, Kratochiwill, Cook and Travers, 2001). Learners expect that the materials and method of instruction should be easily transferable to the real world. Thus, the task of the teacher includes, among others, to provide the materials and experiences to aid learning and meet the learner's expectations (Ogwo, 2004).

Multimedia (MM) can be relevant in teaching various school subjects including biology. MM involves "the use of two or more different types of instructional media in a presentation" (Bartsch, 2009). Supporting this view above, Mayer (2001) noted that an instructional delivery involving the use of VCD/DVD or Power point or 16mm film, for example, is a MM presentation, in that, still pictures, text, graphics, motion picture, background sound as well as some narrations are synchronized and or combined at the same time in order to enhance learners' understanding of a concepts. In this approach, timekeeping and coordination of different media are involved. It also includes use of interactive elements such as graphics, text, video, sound and animation at the same time to deliver lesson (Eneh, 2002; Kellerman, 2004; Dike, 2008; Nkweke, 2010).

Synchronization of MM involves coordination of simultaneous processes to complete a task, be it a task involving film production and utilization, where image and sound are synchronized simultaneously in presenting information to target audience; Digital telephony, video and digital audio where synchronization process and where streams of sampled data are manipulated; Electric powers, where alternator synchronization is required when multiple generators are connected to an electric grid; Digital electronic systems, as arbiters are needed such as microprocessors to deal with asynchronous inputs; Automotive transmissions, where synchronizers allow the toothed rotating parts (gears and splined shaft) to be brought to the same rotating velocity before engaging the teeth; Hypermedia, where data, text, graphics, video are used as elements in a hypertext system. In this case, all the various forms of information are linked or synchronized together so that a user can easily move from one to another and Photography, where synchronization is required in order to achieve good photographic production (Staylor, 2002).

The use of MM in instruction, among other things, reduces learning time, reduces cost, creates room for instructional consistency, mastery learning, increases retention, increases safety, increases motivation, increases access as pupils/students instruction is not confined to times when the instructor is available. Learners enjoy interactive learning and it is efficient, effective and flexible; facilitates communication, appeals to senses of sight and hearing at the same time, provides concrete basis for understanding abstract and difficult concepts and makes for a more meaningful and permanent learning (Staylor, 2002; Kellerman, 2004).

The emergence of modern educational technology in recent times has provided MM equipment like cine film, video-conferencing, 16mm projector film, video disk, satellite (Akaninwor, 1999) but Samaras, Giouvanakis, Bousiou and Tarabanms (2006) opined that MM equipment and programmes are constantly changing, and the range used will depend on the work place. It may include both hardware and software: personal computers and laptops, software programmes e.g. power point, TVs and videos, microphones/amplifier, compact discs, DVDs, projectors, CD burners, scanners, digital cameras, etc.

The teacher is expected to use different techniques, methods and media to facilitate learning in the classroom.. When lectures are augmented by examples, questions, demonstrations, and visual presentation, teaching becomes more appropriate, according to Efebo (1996). Most MM practitioners reflect a cognitive-perceptual philosophy. They have emphasized the values of synchronized MM as a means of involving several senses of the learner and of combating "Verbalism" in the classroom (Kerbyson, Packwood and Joy, 2001).

Due to knowledge explosion all over the world via the internet and worldwide web, biology literacy has also expanded. Recent advances in fields such as biochemistry, ecology, genetics, molecular biology and physiology have made biology a central focus in most human activities including problems on food, water, pollution, health, ecosystem management and conservation etc. Biological literacy and problem solving skills are therefore relevant in view of the above global issues. Therefore, to be able to handle them, a multidisciplinary and interdisciplinary approach that focuses on the learner' inquiry is required. The biology teachers are expected to select and use appropriate instructional media during lesson presentation (Taylor, 2009). Synchronized MM are not only relevant and useful in the context of its use to facilitate learning to achieve a specified and replicable learning outcome, but in enhancing participatory learning when the

learners are directly involved in the process of classroom interaction (Onyegegbu, 2006). And hence MM is an effective instructional media which the teacher can use to deliver learning experiences to Biology students and, therefore, improve the later in Biology courses. This paper therefore examines the effect of synchronized MM on biology students' motivation to learning and academic performance.

Statement of the Problem

The Biology curriculum over the years has been delivered mechanically or by rote learning, which makes instruction teacher-centered. Hardly can vital abstract contents in Biology be effectively communicated to the learners theoretically. They need to be taught using relevant materials. The teacher and his/her method of teaching may have being a major source of student's poor academic performance in biology. Most teachers still prefer using the 'chalk and talk' method in instructing learners. Although MM could facilitate meaningful learning of biology, it is rarely used, whereas this method is considered as a good strategy for improving cognition (Seweje, 1987). A good deal of expected learning outcomes is not realized in Biology in our senior secondary schools [SSS] as a result of non-availability of instructional materials as well as lack of effective utilization of appropriate teaching materials (Adeyegbe, 1993; Nwagbo, 2008). The Biology Chief examiner's reports have in recent years indicated a steady decline in candidates' performance in biology at SSCE (WAEC, 2005; Umeh, 2006).

Purpose of the Study

This purpose of the study is as follows:

1. To determine if the use of synchronized MM motivate interests of students in Biology
2. To investigate into the effect of MM on the academic performance of Biology students.

Research Questions

The study was guided by the following research questions:

1. To what extent does the use of MM materials motivate interest of biology students during instructional development?
2. What are the effects of the use of MM materials on the academic performance of students in biology?

Research Hypotheses

The research questions were translated into the following hypothesis:

1. There will be no significant relationship between motivation of biology students and use of MM
2. There will be no significant difference between the mean score of biology students taught with synchronized MM and the mean score of students taught without it.

Methodology

Research Design

A survey design was used to find out if the use of MM in instruction arouses students' interest in Biology. Quasi-experimental design was also used to determine performance of biology students when taught with and without MM], while correlational design was to ascertain whether the use of MM devices in instruction motivates interest of students in learning Biology.

Study Population and Sample

The target population of the study comprised of all Biology teachers (35) and students (3000) from 15 public secondary schools in Port Harcourt. The purposive sampling technique was used to select four secondary schools and a stratified random sampling technique to select 50 biology students from each school, totaling 200 students and 10 Biology teachers. The selected schools are G.S.S. Elikahia, C.S. S. Nkpolu, C.S, S. Oroworukwo and G.G.SS Oromineke. To ensure that the sample size is a true representation of students of equal intelligence (high and low intelligence), a test was administered to students. Those who scored 70% and above were divided into two equal groups, to form Experimental and Control groups, and those who scored between 40% to 49% were also shared equally into two groups. One group was added to the Experimental group and the other group added to the Control group, making it 100 in each group.

Research Instrument

The following sets of instruments were used for data collection:

Questionnaire

A 4-point Likert questionnaire titled 'Multimedia Motivation Questionnaire' [MMQ] was used to find out from Biology students if the use of MM by teachers motivates their interest in learning the subject.

Biology Achievement Test [BAT]

BAT consisted of 50 multiple choice objective test items. Test items covering topics in *Ecology* were selected from past May/June SSCE biology examination question papers and administered to study groups (experimental and control) in order to determine the effect of use of MM on biology performance of students.

Researcher's Made Instructional Package:

Researcher's made instructional package are in two forms:

- (I) A lesson plan on Biology. The teacher used it to teach a topic in Biology to SS 1 students
- (II) A synchronized VCD recording to help students visualize for further clarification on the same lesson being presented by the Biology teacher. It was produced with the assistance of a Video/Television technical crew.

The teacher taught a lesson on a topic to two groups of students - Experimental group and Control group, using the lesson plan. The experimental group received treatment whereas the control group did not. In other words, while the Biology teacher was teaching his or lesson to the experimental group, the researcher assisted by projecting to a film screen in the class, a synchronized VCD recordings to further illustrate and help the experimental group visualize for more understanding of the lesson being presented by the teacher. The teacher also taught the Control group the same lesson but devoid of synchronized VCD presentation. A combination or synchronization of the teacher's lesson with that of the VCD presentation at the same time on the same lesson provided the experimental group with a MM experience. The control group was denied this advantage. The performances of the two groups were compared with a view to determining the effect of the use of MM on student's academic performance in Biology.

Validity of Instrument

The instruments have been constructed to relate to the problems, research questions as well as hypotheses of the study. Questionnaire items were presented to two Educational Technology specialists from University

of Port - Harcourt and two Biology specialists from Rivers State University of Education, Port – Harcourt. These specialists critically examined the instruments specifically for content validity, clarity of statements, competence of directions, and for suitability. BAT items were specified in the SSCE Biology syllabus.

Reliability of Instrument

The reliability of questionnaire was determined through test-retest approach. About ten percent of the questionnaire was administered to biology students of similar public schools outside the sampled areas within an interval of one month. The scores of all the first and second sets were summed up and correlated using Pearson Product Moment Correlation [PPMC] statistics to determine the reliability co-efficient. The computed reliability co-efficient (r) was 0.90 which means that MMQ was reliable

Administration of Instrument

Questionnaires were administered and by a research assistant who also retrieved the completed questionnaires from the sampled schools. The researchers' made instruments was administered by the teacher with the assistance of an Educational Technologist [ET] specialist. In order words, the Biology teacher was given the lesson plan to do the teaching while the ET specialist supported the teaching by presenting some synchronized illustrations for students to visualize, using VCD. Generator, television set and VCD machine were provided in the school where the study was carried out.

Method of Data Analysis

Statistical mean was used in analyzing the research questions. A 4-point Likert scale of measurement was used: Strongly Agreed 4 point, Agreed 3 point, Disagree 2 point and Strongly Disagree 1 point. A mean score of 2.5 was used as a criterion for acceptance or rejection of an item. Mean score of each item on the questionnaire above the cut-off point is accepted (i.e. Agreed) while mean score below the cut-off point is rejected (i.e. Disagreed).

To test the null hypothesis involving motivation of Biology students and use of synchronized MM, PPMC statistic was used, while t-test was used to test the null hypothesis on the difference between the mean score of Biology students taught with synchronized MM and those taught without MM. The alpha level of 0.05 was used as the acceptable significant level for rejecting or upholding all the assumptions.

Result

The results of survey and quasi-experimental study of the use of MM are presented in tables below, according to the research questions/hypothesis:

Research Hypothesis one: H_{O1}

There will be no significant relationship between motivation of Biology students and use of MM. The above hypothesis was analyzed using the positive responses of items 1- 5 and the negative responses of items 6 – 10 of the MMMQ . The mean scores are shown in tables 1(a) while PPMC is in (b) below:

Table 1(a): Mean Distribution of Students' Responses on the Extent to which MM Motivates Interest of students in Studying the biology

S/n.	Item	Mean	Remark
1	VCD, if used in teaching, can motivate your interest in learning Biology	3.32	Agreed
2	Considering individual differences in learners, teachers' use of MM instructional devices or combination of varieties of instructional media can cater for students learning styles during lesson	3.04	Agreed
3	When teachers use the old traditional teaching method (i.e. use of chalk-talk), it hardly motivate your interest to learn biology	3.13	Agreed
4	When teachers use two or more different types of media during lesson presentation, it helps to facilitate your understanding of the lesson	3.46	Agreed
5	The use of multimedia device like VCD or the combination of two or more types of media can aid recall and retention in students	2.9	Agreed
6	Using VCD in teaching biology cannot support and motivate students interest to learning the subject	2.01	Disagree
7	Combination of two or more media in teaching biology cannot enhance students understanding of biology	1.67	Disagree
8	You feel motivated to learn whenever the English teacher does not combine or use different types of instructional media	1.84	Disagree
9	When your biology teacher do not use reward and combination of different instructional media in teaching, you feel motivated to learn	1.74	Disagree
10	You prefer your teacher using VCD or computer power point to the old traditional chalk-talk method of teaching, when presenting lessons on biology	1.71	Disagree

Table 1a shows that responses to items 1 – 5 were positive (mean scores > 2.5) while the responses to items 6 – 10 were negative (with means < 2.5). Students with positive means or responses were of the opinion that the use of MM in instruction can motivate students' interests in learning biology, while students with negative responses means or responses were of the opinion that the use of MM materials in instructional delivery do not motivate their interest in learning biology

PPMC statistics (r) used to correlate the relationship of the positive and negative opinions to determine possible significant difference is shown in table (1) b.

Table 1 (b): PPMC Statistical Analysis of Students' Responses on the Use of MM in Motivating Interests' in Biology

S/No.	Total Responses	
	Positive	Negative
1	664	402
2	607	334
3	625	367
4	629	348
5	579	342
r	0.84*	
r^t	1.39	
Critical t	3.182	

*Not significant

With 0.05 level of significance and degree of freedom of 3, the computed r value of 0.84 and r^2 value of 1.37 is less than critical t value (3.182). The r value (0.84) is not significant hence the Null hypothesis of no significant relationship between motivation of Biology students and use of MM is upheld.

Hypothesis Two HO₂

There will be no significant difference between the mean score of Biology students taught with synchronized MM and the mean score of students taught without it.:

To analyze the hypothesis above, two sets of scores obtained from the BAT administered on the experimental and control groups were used. Result of t-test of significant difference in biology achievement is shown in table 2 below:

Table 2: t- test Analysis of the Effect of the Use of Synchronized MM on the Academic Performance of biology Students		
	Control Group	Experimental Group
Mean	22.82	51.12
Variance	137.72	333.16
Observations	100	100
Hypothesized Mean Difference	0	
Degree of freedom	169	
t Stat	13.04158516*	
P(T<=t) two-tail	2.40028E-27	
t Critical two-tail	1.974100409	

* Significant at $P < 0.05$

Since calculated t value (13.04) is greater than the critical t value (1.96), the null hypothesis is therefore rejected, which means that the alternate hypothesis is accepted. This is, that there is significant difference in the academic performance of the experimental and control groups. In other words, the experimental group performed academically better than the control group.

Discussion of Findings

The use of MM in instructional delivery is said to motivate students' interest in learning as shown in table one. Motivation is a key variable in education. This view is in consonance with Okoroma's (2000) who affirms that motivation is an important variable that arouses learners' interest and reinforces learning. Morris (2004) and Aggarwal (2007) also affirmed that when visual, audio and synchronized MM are used for teaching, it stimulates several senses thus making the learner more involved in the learning process. Students feel excited and desire to put in their best in leaning effort once they are motivated. Staylor (2002) equally shares the views above but noted that for MM materials to be able to arouse and sustain students' interest; such materials should be designed or packaged in line with MM design principles.

Table 2 shows that MM material like VCD and television that were used to synchronize a lesson presentation to the experimental group in Biology, produced greater academic performance in the

experimental group than in the control group. This finding is consistent with those of Ijhedo (1995), Maurice (2000); Brashears, Akers and Smith (2005), Wickens (2008) and Nkweke (2010). Effective and efficient use of MM in teaching and learning offers both audio and visual messages or information and these appeals to sense of sight and hearing, simultaneously. Students feel a sense of reality in what they learn. This is further supported by (Onyegegbu (2006) and Hoska (2009). A lot of frustrating situations can be saved our children if our teachers use relevant synchronized MM during instructional development, among other realist efforts

Conclusion and Recommendations

MM equipment, when used in instructional delivery process, motivates student's interest to learn and have positive effects on their academic performance. Based on the findings and conclusion of the study, the following recommendations are hereby offered:

1. Government should procure MM devices and distribute to secondary schools
2. The Biology teachers should de-emphasize the use of chalk-talk method of instructional delivery since that method is obsolete and bearing in mind that we are now in information technology
3. Biology teachers should frequently use MM during instructional development, especially when it is inevitable
4. Government should provide secondary schools with electrical power supply or stand-by generators to aid the use of MM equipment
5. Biology teachers should be innovative and use modern MM equipment during instructional delivery in order to motivate students interest in learning, support and reinforce learning, accommodate individual learner's peculiarities, increase students access to learning, provide students with multiple channels of communication, encourage mastery learning and so on
6. Occasionally, the School authorities should invite specialists (educational technologists, instructional material technicians, computer experts, etc.) to assist the Biology teachers with their MM packages that are relevant to the subject.
7. age where teachers are expected to explore the use of modern teaching approaches or information communication technology materials in instruction.
8. The Biology teachers should organize fieldtrips for students to visit places where MM equipment are available so they can learn from such devices.

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Integrating Self-Paced E-Learning with Conventional Classroom Learning in Nigeria Educational System

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Abstract *The advances in Information and Communication Technology (ICT) and its rapid growth are changing the way people use, develop, process and disseminate information and instruction {technology}. There is no doubt that ICT use in the classroom increase student's motivation to learn, engage in learning and give independence in learning. Evidence shows that there is a correlation between using ICT in schools and students academic achievement across a range of courses. Student are comfortable and fulfilled in an ICT environment and using this as a bench mark, [integrating it with a self-paced student centered learning] in conjunction with the conventional classroom learning will go a long way to improve learning thereby increasing academic performance of the students at large. This paper explores the potential of self-paced e-learning alongside with conventional classroom learning and the positive impact the integration of the two can have on student's academic performance when incorporated into the Nigeria Educational system.*

Keywords: *Information and Communication Technology (ICT), Self-paced e-learning, Conventional Classroom Learning, Integration, Nigeria Educational System*

Introduction

ICT has been used in educational settings since its inception, but recent empirical research has affirmed that it plays a vital role in high-quality learning and teaching. Such research insights have shown that advances in technology have opened up new possibilities for the way in which teachers educate their classes, giving potential for innovative ways to encourage students to become more engaged in their schooling. To enable the best possible outcomes for their students it is vital that schools are able to keep up with this progress. (Condie and Munro, 2007).

In an extensive review of the ICT and performance levels in the UK Cox, Abbott, Webb, Blakeley, Beauchamp & Rhodes (2003) found evidence of positive effects on achievement levels in students across a wide range of subjects, which particularly indicates that in European schools ICT has positively enhanced performance in the primary years, particularly in the primary language of the country. Schools that have greater ICT infrastructure perform more highly than schools with less developed ICT infrastructure. Higher motivation is reported, particularly for primary students, with the use of ICT such as interactive whiteboards.

The majority of teachers report that students are more highly motivated, which in turn affects behaviour and communication when using computers and the internet in class. In order to reach European targets set for the year 2010, the numbers of computers in schools have increased dramatically in recent years (Balanskat and Blamire, 2007). Two thirds of teachers report being very confident in their usage of word processors, and a third feel that they have the necessary skills to develop electronic presentations. Almost all teachers in the UK and Denmark report using ICT regularly as a teaching aid, whereas in other countries such as Greece or Latvia, only a third of teachers report doing so.