



## Availability of Multimedia Instructional Aids in the Teaching of Mathematics in Senior Secondary Schools within Minna Town

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**Abstract:** The study focused on the prospects and challenges of the use of multimedia instructional aids in teaching of Mathematics in Senior Secondary Schools within Minna Town. The objective of the study among others was to investigate the adequacy of multimedia facilities for teaching and learning Mathematics in secondary schools within Minna town. Four research questions were formulated to guide the study. Descriptive survey research design was adopted for the study. The population of the study comprised of all secondary school teachers within Minna town and a simple random sampling technique was used to select twenty (20) secondary schools from the population of study (consisting of private and public schools). A simple random sampling using simple balloting was also used to select five (5) teachers from each selected school. This gives a sample size of one hundred (100). Out of the 100 respondents that were given the instrument, only 80 were retrieved which gives a response rate of 80%. A well-structured questionnaire which was validated by three experts was used to collect data for the study. The Pearson's Product Moment Correlation was carried out and a coefficient of 0.81 shows a very strong reliability for the instrument. The data collected from the study were analyzed using descriptive statistics. Findings from the study revealed that majority of the respondents do not have access to the multimedia resources in schools and that they did not make use of the multimedia resources in practical teaching. It is recommended among others that the Nigerian (federal) government and proprietors of private schools should support the teaching of Mathematics by allocating and releasing adequate funds to invest in massive Internet connectivity, as well as purchase and installation of ICT infrastructures in secondary schools.

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**Keywords:** Multimedia instructional aids, Teaching of Mathematics, Senior secondary schools

### Introduction

There is growing awareness in Nigeria that looking at the future of education is important and necessary in order to better grasp the opportunities that will arise as societies move towards an increasingly digitalized, networked and knowledge-based society. The relevance of education to the growth and development of any nation cannot be over emphasized. Education is so crucial to economic growth that any nation that genuinely hopes to develop must vehemently and consistently appropriate a large chunk of the budget to developing its educational sector. This is because without education, no nation would attain meaningful economic and socio-political development. A new vision of "computer technology in education" is needed that takes into account the shifts and trends (e.g. e-learning, web based learning, virtual library, globalization, migration, demographics,

technological progress) that are transforming the way people work, learn, transact business, enjoy themselves and make sense of their world (Adomi and Anie, 2006).

The use of multimedia in industries has been extensive, as it has been effective in increasing productivity and retention rates, where research has shown that people remember 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously (Lindstrom, 2012). Multimedia is now permeating the educational system as a tool for effective teaching and learning. With multimedia, the communication of information can be done in a more effective manner and it can be an effective instructional medium for delivering information. Multimedia access to knowledge is one of the possibilities of information and communication technology that has tremendous impact on learning. The instructional media have

emerged in a variety of resources, and equipment, which can be used to supplement or complement the teachers' efforts in ensuring effective learning by students. It is recognized that conventional media technologies can no longer meet the needs of our teaching and learning processes; as a result they are being replaced by multimedia technology. This technology provides a learning environment that is self-paced, learner-controlled and individualized (Bottino, 2014).

Multimedia in Education has been extremely effective in teaching individuals a wide range of subjects. Multimedia is changing the way we communicate with each other. The way we send and receive messages is more effectively done and better comprehended. While a lecture can be extremely informative, a lecture that integrates pictures or video images can help an individual learn and retain information much more effectively. Using interactive CD-ROMs can be extremely effective in teaching students a wide variety of disciplines, most notably languages and music. A multi-sensory experience can be created for the audience, which in turn, elicits positive attitudes towards its application (Neo and Neo, 2000). Multimedia has also been shown to elicit the highest rate of information retention and result in shorter learning time (Ng and Komiya, 2000). On the part of the creator, designing a multimedia application that is interactive and multi-sensory can be both a challenge and thrill. Multimedia application design offers new insights into the learning process of the designer and forces him or her to represent information and knowledge in a new and innovative way (Agnew et al, 2006). However, information technology application serves different purposes, such as knowledge sharing-portal, search engines, public administration, social service and business solution.

Oshodi (2009) posits that awareness created towards the use of information and communication technology over the years is increasing in the classroom learning environment in the third world such that mere verbalization of words alone in the classroom to communicate ideas, skills and attitude to educate learner is futile. Omagbemi (2004) supporting this view expressed that access to multimedia information could stimulate changes and creates conducive learning environment and make learning more meaningful and responsive to the localized and specific needs of learners.

Mathematics is a core subject taught at the secondary school level because it is believed to be essential in laying a solid foundation for the teaching of other subjects like Physics, Chemistry, Financial Accounting, Economics, and Geography at the Senior Secondary School level and courses such as

Engineering, Economics, Business Management and other Science courses cannot be studied in higher institutions without a good foundation of Mathematics. This explains why Mathematics is a major requirement for entry into any higher institutions in Nigeria (Salehdeen and Murtala, 2004). The performance of students in Mathematics at secondary school level could therefore influence their choice of career in future. The facilities required for effective teaching and learning of mathematics include adequate classroom space, curriculum system, experienced and well motivated teachers, teaching-learning materials such as text books, boards, chalks (marker), visual aids etc (Fahlström, 2017). Although all secondary schools in Niger state are under the direct supervision of the state Secondary Education Board, but a number of differences exist in their performance in Mathematics among the secondary school students across the state. Thus, when there is proper planning and implementation of the basics of Mathematics in curriculum system in secondary schools, there will be positive developments in the academic performance of students in Mathematics and other subjects (Adeniran, 2000).

#### **Statement of the Problem**

There is an urgent need to improve the quality of education to bridge the gap between developed and developing nations, and multimedia instruction is considered as a necessary tool for this purpose (Omotoba, 2016). However, the presence of multimedia alone will not stimulate significant changes in a school. Teachers are important ingredient in the implementation of multimedia instruction in education. Without the involvement of teachers, most students may not take advantage of all the available potential benefits of multimedia on their own. Teachers need to actively participate in the use of multimedia facilities. They must be trained in the use of multimedia and in its integration in the classroom activities to enhance thinking and creativity among students. They must also learn to facilitate and encourage students by making them responsible for their own learning. Many of the current graduates were found to be lacking in creativity, communications skills, analytical and critical thinking and problem especially with the use of ICT equipment in the teaching of Mathematics in secondary schools (Tan, 2000). In this study, attempts are therefore made at examining the prospects and challenges of the use of multimedia instructional aids in teaching of Mathematics in senior secondary schools within Minna town.

### Objectives of the Study

The following are the objectives of the study:

1. Determine the availability of instructional multimedia in secondary schools within Minna town.
2. Determine the pattern and frequency of use of multimedia by Mathematics teachers in secondary schools within Minna town for teaching and learning.
3. Investigate the adequacy of multimedia facilities by Mathematics for teaching and learning in secondary schools within Minna town.
4. Identify factors, if any, which limit the use of multimedia by the Mathematicsteachers in secondary schools within Minna town.

### Research Questions

The following research questions were formulated to guide the study:

1. How available are the instructional multimedia for teaching and learning of Mathematics in secondary schools within Minna town?
2. What is the pattern and frequency of use of the multimedia for teaching and learning by Mathematics teachers in secondary schools within Minna town?
3. How adequate are the multimedia facilities for teaching and learning Mathematics in secondary schools within Minna town?
4. What factors limit the use of multimedia by Mathematics teachers in secondary schools within Minna town?

### Significance of the Study

The results of this study will provide useful information to students on the various multimedia

resources used in instruction and their relevance to effective teaching and learning in secondary schools. The result also will help in the provision of guidance to Mathematics teachers on the application of appropriate multimedia instructional resources in teaching and in the identification of possible solutions to the problems associated with the application of multimedia resources. The government will gain from this research as it will help in formulating policies relating to the National Information Technology Policy in Education. Finally, this study will be a vital source of information to researchers who want to conduct a research in the related topic.

### Methodology

The descriptive survey research design was adopted for the study and the population of the study comprised of all secondary school teachers within Minna town. Four research questions were formulated to guide the four objectives of the study. A simple random sampling technique was used to select twenty (20) secondary schools from the population of study (consisting of private and public schools). A simple random sampling technique was also used to select five (5) teachers from each selected school. This gives a sample size of one hundred (100). Out of the 100 respondents that were given the instrument, only 80 were retrieved which gives a response rate of 80%. A well-structured questionnaire which was validated by three experts was used to collect data for the study. A pilot study was carried out in two secondary schools outside the population of study but with similar characteristics. The Pearson's Product Moment Correlation was carried out and a coefficient of 0.81 shows a very strong reliability for the instrument.

### Results and Discussions of Findings

Table 1: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	60	75.00
Female	20	25.00
Total	80	100.00

The information in Table 1 above showed that 60 (75.00%) of the respondents were male teachers while 20 (25.00%) constitute female teachers.

Table 2: Distribution of Respondents by Years of Experience

Years of Experience	Frequency	Percentage (%)
1 – 5 years	20	25.00
6 – 10 years	40	50.00
11 – 15 years	16	20.00
15 years & above	4	5.00
Total	80	100.00

The result from Table 2 showed clearly that 40 (50.00%) of the respondents had 6- 10 years of teaching experience whereas 20 (25.00%) had between 1 – 5 years. 16 (20.00%) of the respondents

had put in between 11-15 years, while only 4 (5.00%) of the respondents had spent over 15 years as teachers impacting knowledge to students.

**Research Question 1:** How available are the instructional multimedia for teaching and learning of Mathematics in secondary schools within Minna town?

Table 3: Availability of Multimedia Resources

Availability	Frequency	Percentage (%)
Yes	28	35.00
No	52	65.00
Total	80	100.00

From Table 3 above, 52 (65.00%) of the respondents indicated that multimedia resources were not available in the schools for their use in teaching

and learning while the remaining 28(36.00%) of the respondents indicated that multimedia resources were available.

**Research Question 2:** What is the pattern and frequency of use of the multimedia for teaching and learning by Mathematics teachers in secondary schools within Minna town?

Table 4: Adequacy of Multimedia Collection

Adequacy	Frequency	Percentage (%)
Adequate	08	10.00
Fairly Adequate	12	15.00
Inadequate	20	25.00
Grossly Inadequate	40	50.00
Total	80	100.00

Table 4 above revealed that 40 (50.00%) of the respondents viewed the multimedia collections as grossly inadequate to their aspiration (teaching, learning, research and presentations); 20 (25.00%) ranked them as being inadequate; 12 (15.00%) indicated fairly adequate to their needs for teaching

and learning while only 8 (10.00%) of the respondents viewed them as being adequate. It could be inferred that the multimedia facilities in these schools are not adequate as a greater percentage 60 (75.00%) of the respondents viewed the collection or facilities as being inadequate.

**Research Question 3:** How adequate are the multimedia facilities for teaching and learning Mathematics in secondary schools within Minna town?

Table 5: Accessibility to Multimedia Resources

Availability	Frequency	Percentage (%)
Yes	28	35.00
No	52	65.00
Total	80	100.00

To multimedia resources in school while 52 (65%) of the respondents, a larger percentage had no access. This implies that much is required to facilitate easy access to multimedia resources.

Table 6: Types of Multimedia Resources being used

Type	Frequency	Percentage (%)
Transparency	4	5.00
Television	44	55.00
Radio	56	70.00
Projector	56	70.00
Graphics	56	70.00
CD-ROMs	60	75.00
Computer & its Accessories	76	95.00
Internet & its Facilities	80	100.00

From the table above one can gather that the mostly used of the multimedia are the Internet and its facilities as all the respondents signified that they used it; followed by computer and its accessories 76 (95.00%); CD – ROMs 60 (75.00%); then Radio, Projector and Graphics 56 (70.00%); while Television 44 (55.00%) and Transparency 4 (5.00%) were the least being used.

Interview sessions held with these respondents as to what they used these resources for and where they used them revealed that majority 65 (81.25%) of the respondents used the multimedia

resources for their research and publication activities and outlets; paper presentations; forming lesson notes used in teaching and not in the actual use in the classroom for teaching. Major reasons for not using these facilities in teaching their students were adduced to lack of infrastructural facilities, lack of ICT training skills and time to spend on the technology. Similarly, majority 65 (81.25%) of them signified that they made used of these materials at their homes and while the remaining 25 (18.75%) signified that they made use of these facilities on the campus and cybercafes outside the campus.

Table 7: Frequency of Use of Multimedia Resources

Multimedia	Very Often	Often	Seldom/Sometimes	Rarely	Never
Transparency	-	-	4 (5.00)	-	76 (95.00)
Television	10 (12.50)	30 (37.50)	4 (5.00)	-	36 (45.00)
Radio	16 (20.00)	35 (43.75)	5 (6.25)	-	24 (30.00)
Projector	30 (37.50)	16 (20.00)	10 (12.50)	-	24 (30.00)
Graphics	10 (12.50)	26 (32.50)	20 (25.00)	12 (15.00)	12 (15.00)
CD-ROMs	30 (37.50)	20 (25.00)	10 (12.50)	-	20 (25.00)
Computer	64 (80.00)	12 (15.00)	4 (5.00)	-	-
Internet	70 (87.50)	10 (12.50)	-	-	-

\* Note: Values in parenthesis ( ) are %

Table 7 presented the frequency of use of the multimedia resources by the lessons in the schools. A critical observation of the result showed that Internet and its facilities have the highest

frequency of use 80 (100.00%) with 70 (87.50%) using it very often and 10 (12.50%) often; followed by computer 76 (95.00%) with 64 (80.00%) using it very often and 12 (15.00%) often while Television 44

(55.00%) with 10 (12.50%) using it very often and 30 (37.50%) often and Transparency 4 (5.00) only seldomly using it have the least frequencies. This is an indication that the Internet, computer and its

accessories; as well as radio, projector and graphics were regularly being used in the teaching, research and publication activities while television and transparency are rarely being used in these processes.

**Research Question 4:** What factors limit the use of multimedia by Mathematics teachers in secondary schools within Minna town?

Table 8: Factors limiting the use of Multimedia in Schools

Factors	Frequency	Percentage (%)
Lack of supportive infrastructures	80	100.00
Lack of time to spend on technology	80	100.00
Inadequate or Lack of/Inadequate training	70	87.50
Inadequate capital on the part of the individual	60	75.00
High cost of technology	55	68.75
Wrong choice of software or software inadequacy	50	62.50
Lack of understanding of the value or possible benefits of multimedia facilities	50	62.50
Lack of perceived economic or other benefits	50	62.50
Too hard to use	30	37.50
Not user-friendly	10	12.50
Non-existent of service	10	12.50

As shown in the table above, the order of importance of the constraint factors: lack of supportive infrastructures (100.00%), lack of time to spend on technology (100.00%), lack of/Inadequate training (87.50%) and inadequate capital/funds on the part of the individual lesson (75.00%) appear to be the major constraint factors affecting or limiting Mathematics teachers' use of multimedia and ICT in these secondary schools. Whereas multimedia in terms of being too hard to use, not user friendly and nonexistence of service are found to be of less importance having 37.50%, 12.50% and 12.50% respectively.

### Conclusion

Based on the findings of this study, the following conclusions were made: Majority of the respondents do not have access to the multimedia resources in schools probably this might be responsible for use of these materials at their homes and cybercafes. The multimedia collections in these schools are being viewed by respondents as being grossly inadequate. 28 (35.00%) of the respondents had access to the multimedia resources available in schools while the remaining 52 (65.00%) do not have access. It was also found that majority of the respondents did not make use of the multimedia resources in practical teaching but rather in forming lesson notes for teaching their students, paper

presentations, research and publication activities/outlets.

It was also found that the mostly used multimedia facilities were being used for research and publication activities rather than for teaching their students. The study further revealed that the Internet and its facilities as well as the Computer and CD-ROMs were the mostly used of the multimedia resources while the television and transparencies were the least being used. Lack of supportive infrastructures; lack of time to spend on technology, inadequate and or lack of training, inadequate fund on the part of individual teachers and high cost of technology were the major constraint factor limiting the use of multimedia for real – life experience in teaching their students.

### Recommendations

Based on the findings from the study, the following recommendations were made:

1. The Nigerian (federal) government should see ICT integration effort at secondary school as an embracing project to development in education and should support by allocating and releasing adequate funds to invest in massive Internet connectivity, as well as purchase and installation of ICT infrastructures. Also, the management of secondary schools must aim

to ensure accessibility, availability and reliability of ICT facilities such that every staff room staff offices have computers linked to Internet and have equipment appropriate for accessing a range of electronic resources.

3. The government can also help by subsidizing or reducing the tariffs on importation of ICT facilities so that Mathematics teachers and others can afford the purchase of these ICT facilities and accessories since the price will come down.
4. Adequate, competent and experienced ICT technical staff must be made available should problem arises with the integration of ICT in secondary schools.

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