Use of Multimedia in Teaching and Learning of Basic Science in Junior Secondary Schools.

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ABSTRACT
The Purpose of the study was to find out the use of multimedia in teaching and learning of Basic Science in Junior Secondary Schools. The study was conducted at Rehama Academy, Rumuolumeni, Rivers State. Two research objectives and two research questions were used for the study. The population of the study comprises of all junior secondary school students in Rehama Academy. A sample of 100 students were randomly selected from JSS 1, JSS 2 and JSS 3 Students. Mean scores and standard deviation were the statistical tools used in the study. Simple random sampling techniques was used for the study and the instrument used to collect data was a structured questionnaire titled UMTLBSJSS with a 22 item questions. The instrument was given to experts in the field of Educational Psychology/measurement and evaluation to ensure its validity. Test retest was applied to ensure reliability of the instrument with 0.64. The study found that the following multimedia tools are useful in the teaching and learning of physics; text, images, audio and streams, digital videos, animations, graphics, computer simulation, talking books and speech synthesis, CD-ROM storybook, hypermedia and flash. It also found that Multimedia tools help in addressing students need and offer new means to present curriculum content. Based on these findings, the researcher recommends that since from findings of this study it shows that students accept multimedia tools as very useful in the teaching and learning of physics therefore these materials should be available in schools for proper utilization
Keyword: Multimedia, Physics, Teaching, Learning, Blended Classroom.

I. INTRODUCTION
Science refers to a system of acquiring knowledge, using observation and experimentation to describe and explain natural phenomena. Science may be called pure science or applied science.
According to Ndu, Olarewaju, Ndu&Somoye (2017), the benefits of Basic science include the following:
1.   The knowledge of science has made it possible to produce drugs for diseases.
2.   The knowledge of science has made the discovery of new galaxies, planets and perhaps, existence of life on them possible
3.   The knowledge of science helps us to have intelligent respect for nature, which then helps us to take decisions on the uses of technology to improve the world for humans and all living things.
Using multimedia in the classroom helps the teacher teach basic science and engage the students and helps them be more involved and retain more information from the lesson learnt. Multimedia is a media and content that uses a combination of different forms. Multimedia is used in comparing media that uses only rudimentary computer display such as text- only, or printed or hand- made materials. Multimedia includes a combination of text, audio, still images, animation, video or interactivity content forms. It is normally recorded and played, displayed or seen by information content processing devices like electronic and computerized devices which can only be in the case of live performance.
Multimedia may be divided into linear and non- linear classes. Linear multimedia active content progresses without any navigational control for the learner such as a cinema presentation. Nonlinear uses interactivity to control progress as used with a video game or used in self- paced

computer-based training, example includes hypermedia. Multimedia presentations can be live or recorded. A recorded presentation can be live or recorded. A recorded presentation may allow interactivity via a navigation system. A live multimedia presentation may allow interactivity via interaction with the presenter or performer. Multimedia presentation can be viewed by persons on stage, projected, transmitted, or played locally with a media player.

In education, multimedia is used to produce computer-based training courses and reference books like encyclopaedia and almanacs. The training courses lets the user go through a series of presentations, texts about a particular topic, and associated illustrations in various information formats. Edutainment is an informal term used to describe combining education with entertainment, especially multimedia entertainment. Media is a major focus in education today, particularly in the higher education. Technologies like data (and productivity application) and videos that share resources and interact with each other are defined as separate technologies. Media convergence is rapidly changing the curriculum in universities all over the world. It is changing availability or lack of jobs requiring this savvy technological skill. Multimedia enables learning through exploration, discovery, and experience. Technology does not necessarily drive education. That role belongs to the learning needs of students. With multimedia, the process of learning can become goal- oriented, more participatory, and flexible in time and space, unaffected by distances and tailored to individual learning styles, and increase collaboration between teachers and students. Multimedia enables learning to become fun and friendly, without fear of inadequacies or failure. The pedagogical strength of multimedia is that it uses the natural information- processing abilities that we already possess as humans. Multimedia teaching will bring students into a class where they can interact with the teacher and the subject. Multimedia teaching is more intuitive than old ways; teachers can simulate situations in real life. In many circumstances teachers don't have to be there, students will learn by themselves in the class. More importantly, teachers will have more approaches to stimulating students' passion of learning. Multimedia finds its application in various areas including but not limited to advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial temporal applications. Loretto, 2012 defines multimedia as using computers to present text, audio, video, animation, interactive features, and still images in various ways and combinations made possible through the advancement of technology.

As a new multimedia teaching aid gradually been widely applied to physics teaching the modern techniques of classroom instruction, which itself is a powerful temptation for students and teaching students to have fun and visually stimulating interest in learning performance to accelerate understanding of students' knowledge, receive and process the memory, the students, but also happily accepted. The use of multimedia assisted teaching practices with the continuous development of modern teaching techniques, teaching multimedia in the form of new aid more widely applied in physics education among its intuitive, fun, high- capacity, etc. are other methods traditional teaching cannot match, no doubt the teaching of physics in a new life, while improving the effectiveness of classroom teaching.

The use of multimedia computer aided instructions can stimulate interest in learning, transfer learning initiative. The use of multimedia computer assisted learning modern techniques of classroom instruction, which itself is a powerful temptation for students while teaching valuable properties and intuitive happy student interest in learning, for example? Lens? Section, the illustrations of textbooks in a slide presentation on multimedia computer chip put in pictures, sounds, colours and other forms of information into one, by introducing a video presentation of lenses to demonstrate to students. At this time, students think and feel in the best conditions to continue to guide them to lay a good foundation for learning. The use of multimedia computer assisted instruction can improve teaching methods, breaking the difficulty of teaching. The use of multimedia computer assisted instruction information capacity, improve teaching effectiveness. Multimedia information in the process of general education, higher capacity, but the collection of maps displaying the information, text, sounds and colours of a strong image, rapid reproduction, infection and strong to break time constraints, to further improve the student's variety of senses to their fullest potential, to accelerate understanding of students' knowledge, receive and process the memory, the students, but also happily accepted.

Multimedia could be interpreted as a combination of data carriers, for example video, CD- ROM, floppy disks, internet and software in which the possibility for an interactive approach is offered (Smeets, 1996)
Fetterman (1997) also viewed multimedia as those resources used for instruction that include one or

more media such as graphics, video, animation, image and sound in addition to textual information. He identified four important characteristics of multimedia as:

▪ Multimedia systems are computer controlled
▪ Multimedia systems are integrated
▪ The information content must be represented digitally
▪ The interface to the final presentation of media.

Ogunbote and Adesoye (2006) expressed that multimedia technology adds new dimension to learning experiences because concepts are easier to present and comprehend when the words are complemented with images and animations. It has been established that students retain more when a variety of senses are engaged in impacting knowledge; and the intensity of the experience aids retention and recall by engaging social emotional and intellectual senses.

There are numerous types of multimedia but few of them will be discussed, and their forms will be discussed focusing on their potentials for supporting diverse learners.

Computer simulation

Apart from multimedia teaching, computer- based laboratory, one of the importantly used areas of computer is the education and training process run by simulations. Computer simulations are now an integral part of contemporary basic and applied physics, and computation has become as important as theory and experiment. With the help of a powerful simulation many physics subjects which are difficult to teach and transfer can be made simpler and clearer. Also, some experiments which are difficult to make or hard for the students to understand in a real laboratory can be made much simpler with the help of simulations. In this way physics courses are becoming a fun and immersive. Over the last two decades a great deal of educational research has been directed towards the computer simulation in physics education (Li, Ma, & Shi 2011).

Much of science learning is hands on, but there are instances when it is impractical or impossible for students to participate in certain activities. When- because of cost, time, safety issues, or accessibility- students are unable to engage in certain activities, computer simulation can be an effective approach (Huppert, Lomask, &Lazarowitz, 2002). Simulation may take many different forms, such as micro-worlds or virtual laboratories. Virtual laboratories are similar to micro worlds, although they may be less involved. What all types of simulations have in common

however, is that they allow students to become completely immersed in a simulated world as they explore and learn progressively more complex topics and tasks. Simulations promote the use of critical and evaluative thinking. Because they are ambiguous or open-ended, they encourage students to contemplate the implications of a scenario. The situation feels real and thus leads to more engaging interaction by learners. Simulations promote concept attainment through experiential practice. They help students often find them more deeply engaging than other activities, as they experience the activity first-hand, rather than hearing about it or seeing it. Simulation helps students appreciate more deeply the management of the environment, politics, community and culture.

Animations

Educational animations are produced for the purpose of fostering learning. The popularity of using animation to help learners understand and remember information has greatly increased since the advent of powerful graphics- oriented computers. This technology allows animations to be produced much more easily and cheaply than in former years. For example, PowerPoint has an easy –to- use animation facility that in the right hands can produce very effective educational animations. Because animations can explicitly depict changes over time (temporal changes), they seem ideally suited to the teaching of processes and procedures. When used to present dynamic content, animations can mirror both the changes in position (translation, and the changes in form (transformation) that are fundamental to learning this type of subject matter.

Animation can be used to communicate sophisticated concepts in all levels of class settings where by some students who have difficulties in understanding have a form of media that gives them a new way of learning. Animations use action and reactions, which are basic principles in physics. The concept of reflective angles, gravity and acceleration are all implemented in the action of objects and characters in an animation sequence. Because animation is a two-dimensional representation with a time coordinate, it forces the students, even as young as six to literally be graphing information on three-dimensional level. Intuitively the student is learning complex mathematical concepts. Animation has a meditative and contemplative effect within the creative process. Once the planning has been finished, the repetitive/manufacturing process takes over. As a teaching tool, animation has many applications and can provide a deeper level of learning for the student (Vera, 2009).

Animation can work with text, artwork, scanned images, photographs, diagrams and clipart (power point software). It can also combine video with animated overlays and titling providing the ideal tool for enhancing fieldwork and school trip videos, drama productions, sports events and media studies (Clark& Mayer, 2008). Well- designed animations may help students learn faster and easier. They are also excellent aid to teachers when it comes to explaining difficult subjects. The difficulty of subjects may arise due to the involvement of mathematics or imagination. For example, the flow of electric circuit is invisible. The operation of electric circuits is difficult for students to understand at the beginning. With the aid of computer animations, learning and teaching might become easier, faster and amusing (Tversky, Morrison &Betrancourt, 2002).

According to Joshi (2021), the following are the advantages of animations in education:

1. Improve skills and knowledge: animation in education makes use of visuals for learning. It presents abstract concepts through visuals to provide learners a clear picture of the lesson. A noteworthy feature of animation in education is its visual impact on the learners. Owing to their short attention span, contemporary learners often digress from the lesson and fail to learn effectively. However, animated videos are short and cover only relevant content while grabbing learner's attention. Learners develop their skills and knowledge through short visual representations.

2. Promotes learner engagement: animation in education is all about interactive learning. It incorporates various learning styles in one. Educators can use animation to create lessons as well as assessments that engage learners.

3. Emphasizes learning: animation in education is a combination of entertainment and learning. Animated eLearning videos cover complex topics with easy-to-understand visuals.

4. Interactive learning: video-based learning is known to be an effective method of learning, owing to its numerous benefits. Different learners follow varied video learning styles, depending on the patterns of learning that they follow. The use of graphics and audio makes learning interactive and participatory. Learners interact with the course content and comprehend the lesson quickly.

5. Experiential learning: animation in education allows learners to experience experiments that are otherwise not safe to perform. It gives the learners an experience that they could only get by performing them in real life.

6. Fuels learner imagination: videos can teleport the learners to an entirely different world with virtual reality. The use of different colours, shapes and pictures appeal to the learner's imagination.

7. Easily accessible and affordable: employing animation in education is extremely affordable. Learners can revisit a video for recapitulation and revision. This means that they can access these videos anytime and anywhere. The only requirement is a smartphone or computer with an internet connection.

CD-ROM Storybooks

CD- ROM storybooks offer digital text in combination with features such as animations, illustrations, speech, and sound. For example, a CD-ROM storybook might offer the story text together with animations, vocabulary definitions, and sound effects. Some storybooks incorporate an audio version of the text. CD-ROM storybooks offers great potential for engaging students and some incorporate valuable literacy supports. Thus, they can benefit reluctant readers and students with deficits in basic literacy skills. However, their multimedia features are not always instructionally germane (Doty, Popplewell& Bayer 2001). Some storybooks feature entertaining animations and sound effects that, while entertaining, do not directly support access or learn. In fact, they may be distracting for some students. Thus, teachers are wise to select CD- ROM storybooks carefully and with consideration of individual student characteristics (Trushell& Maitland 2005).

Hypermedia

Hypermedia refers to hyperlinked multimedia- the linkage of text, audio, graphics, animation, and/or video through hyperlinks. For example, a hypermedia study guide might offer illustrated textbook content hyperlinked to web-based video and other content, glossary entries, and comprehension questions (Moore- Hart, 1995). Other hypermedia applications for the classroom include supported digital reading environments and lessons.

Hypermedia offers a powerful means to integrate curriculum content with instructional supports and address varied student needs. Digital texts can be enriched with a range of instructional supports such as vocabulary definitions, glossaries, translations, explanatory notes, background information, and instructional prompts. Each of these supports can take the form of varied media. For example, vocabulary definitions might be presented as text, pictures, and/or animated

graphics. Background information might be presented as a map, video, annotated bibliography with text and audio or illustrated timeline (MacArthur, & Haynes, 1995).

Statement of Problem

The importance of multimedia in education generally in face of globalization cannot be overemphasized. This is because apart from the fact that it makes teaching- learning easier it creates variety and ultimately enhances retention. In relation to physics education the learning process would be less abstract and more value added to the teaching- learning as it becomes more meaningful. But the appearance of multimedia alone will not arouse important changes in a school setting. Teachers are very important in the implementation of multimedia instructions in classroom. They will help students to understand the advantages of all the available multimedia tools for learning. And this will only happen if the teachers are trained on the use of multimedia materials for effective teaching and if they are trained, how many of them apply or use these tools for teaching and learning in the classroom. This study therefore examines multimedia use in physics teaching and learning.

Objectives of the Study
Specifically, the study intends to:
1. Identify specific multimedia tools applicable in Basic Science classroom
2. Determine usefulness of these media in teaching and learning of Basic Science

Research Questions
1. What are the multimedia tools used in teaching and learning of Basic Science?

2. What are the usefulness of multimedia tools in teaching and learning of Basic Science?

II.   METHODOLOGY

The study is a descriptive survey research designed to find out the use of multimedia in teaching and learning of Basic Science in Junior Secondary School. The area of the study was Rehama Academy, Rivers state. The population of the study comprises of all junior students in JSS1, JSS2 and JSS 3.A sample of 100 students were involved in the study. Simple random sampling technique was applied in the selection process.The Instrument used for the study to collect data from respondents is a structured questionnaire titled Use of multimedia in teaching and learning of Basic Science in Junior Secondary School (UMTLBSJSS) with a 22 item questions. To ensure validity, the designed instrument by the researcher was given to experts in the field of educational psychology, measurement and evaluation. This was done to help the researcher assess the quality of each item in the context of clarity, ambiguity and generality of the items. Their various comments and assessment gave the researcher the conviction that the instrument is appropriate and valid for the research. To determine the reliability of the instrument, test-re-test was applied; 20 copies of the instrument were administered on some students at two different occasions within three weeks. Their responses to the questionnaire item in the two separate responses were correlated to attain the reliability co-efficient of 0.64. Mean and Standard Deviation was the statistical tools used for the study.

III.   DATA PRESENTATION

Results and Discussion

What are the multimedia tools used in teaching and learning of physics in the 21st century classroom?

Table 1.1: Multimedia tools used in teaching and learning of physics

S/N	Multimedia tools used in teaching and learning of physics in the 21st century classroom	Mean	Standard Deviation
1	Text	3.58	0.49
2	Images	3.54	0.49
3	Audio files & streams	3.54	0.49
4	Digital videos	3.68	0.46
5	Animation	3.51	0.49
6	Graphics	3.51	0.49
7	Computer simulation	3.45	0.55
8	Talking books & Speech synthesis	3.62	0.48
9	CD-ROM Storybook	3.44	0.53
10	Hypermedia	3.50	0.49
11	Flash	3.55	0.51
	Over All Mean	3.53	0.49

Table 1.1 revealed that students accepted all the item as the multimedia tools used in teaching and learning of Basic Science. This is because all the item mean was above the criterion mean of 2.50.

An overall mean of 3.53 suggests that multimedia tools are useful for teaching basic science effectively in the 21st century classroom.

1.2 What is the usefulness of these media in teaching and learning of physics?

Table 1.2: Usefulness of multimedia in teaching and learning of physics

S/N	Usefulness of multimedia materials in teaching and learning of physics in the 21st century classroom.	Mean	Standard Deviation
1	Text in media system can express specific Information and can act as reinforcement	3.56	0.49
2	Images help students with disabilities to understand certain concepts in physics	3.59	0.48
3	Computer animation are used to help students understand and see things change over time	3.52	0.49
4	Animations can be used to illustrate fine point of mechanical or electrical designs	3.58	0.49
5	Videos are used to bring the real world into the classroom	3.60	0.48
6	Computer simulation helps students change variables easily	3.53	0.51
7	Computer simulation helps in drawing graphs	3.57	0.51
8	Talking books and speech synthesis help students with decoding problems	3.71	0.45
9	Speech synthesis and talking books increases engagement and motivation	3.61	0.48
10	Hypermedia can support differences in students' ability to access specific media forms and differences in their literacy and media literacy skill	3.55	0.49
	Overall Mean	3.58	0.48

Table 1.2 revealed that students accepted all the item as the usefulness of multimedia materials used in teaching and learning of basic science in classroom. An overall mean of 3.58 suggests that text, images, computer animation, videos, computer simulation, talking books and speech synthesis, hypermedia and flash are all useful multimedia technologies used for basic science.

IV.   DISCUSSION OF FINDINGS

Research Question 1: **What are the multimedia materials used in teaching and learning of basic science?**

The result shows that multimedia tools such as text, images, audio files and stream, digital videos, animation, graphics, computer simulation, talking books & speech synthesis, CD-ROM Storybooks, hypermedia and flash are some of the multimedia tools that can be useful in teaching and learning certain concepts in physics effectively. Students with various disabilities will have opportunity to benefit and improve their performances in classroom. This result is expected because tertiary institutions today are learning to

bring 21st century skills into the classroom and multimedia tools like the ones mentioned above are being used.

The result of this study is in agreement with those of Oshinaike and Adekunmisi (2011) who found out that access to multimedia information could stimulate changes and create conductive learning environment and make learning more meaningful.

Research Question 2: what is the usefulness of these media in the teaching and learning of basic science?

The study found that text, images, videos, animations, computer simulation, talking books and speech synthesis and hypermedia are useful materials for teaching and learning of basic science in the 21st century classroom. This is true because with the use of these materials students need is addressed and they find basic science more interesting. The study is in agreement with those of Tversky, Morrison &Betrancourt, (2002) who found that with the aid of computer animations, learning and teaching might become easier, faster and amusing.

V.   CONCLUSION

The following conclusions were made by the researcher:

1. The multimedia materials such as text, images, audio files and streams, digital videos, animation, graphics, computer simulation, talking books and speech synthesis, CD-ROM storybooks, hypermedia and flash are found to be very useful in the teaching and learning of basic science.
2. Multimedia materials help in addressing students need and offer new means to present curriculum content.

Recommendation

1. The overall finding of this study shows that students accept multimedia materials as very useful in the teaching and learning of basic science therefore these materials should be available in schools for proper utilization.
2. Multimedia should be adapted to all learning level

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