Effectiveness Of Multimedia Learning Tools In Education

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Abstract:

In 1895, Gugliemo Marconi sent his first wireless radio transmission at Pontecchio , Italy. A few years later (in 1901) he detected radio waves beamed across the Atlantic. Initially invented for telegraph, radio is now a major medium for audio broadcasting. Television was the new media for the 20th century. It brings the video and has since changed the world of mass communications. Furthermore the satellite, computers, audio, and video converged to create new media with enormouspotential combinedwith the advances inhardware and software, these technologieswere able to provide enhanced learning facility and with attention to the specific needs of individual users. Multimedia technology empowers the educational process by means of increased interaction between teachers, students, and courseware also innovative ways to make learning more dynamic, longer lasting, and more applicable to the world outside the classroom.

Original Creators: Thomas Wilfred, the Father of Multimedia.

Keywords: Multimedia, E-learning, Multimedia Technologies, Educational Technology, Multimedia Courseware, Multimedia Classroom.

I. INTRODUCTION

The realm of education is undergoing a remarkable transformation in the digital age, and at its heart lies the integration of multimedia learning tools. These tools encompass a diverse range of technology-driven resources, such as videos, animations, interactive simulations, virtual reality experiences, and e-books, designed to enrich and enhance the learning process. As we delve into the realm of multimedia learning tools in education, we embark on a journey to uncover their profound impact, both in terms of their potential benefits and the challenges they may pose.

The effectiveness of multimedia learning tools in education is a topic of growing significance, representing a convergence of pedagogy, psychology, and technology. In essence, it is a quest to leverage the dynamic capabilities of multimedia to captivate learners, deepen their comprehension, and ultimately elevate educational outcomes. This exploration seeks to navigate the complexities surrounding these tools, shedding light on their virtues and limitations.

Within this comprehensive examination of the effectiveness of multimedia learning tools, we will first explore their advantages. These tools have the potential to foster higher levels of engagement, catering to diverse learning styles and rendering intricate subjects more comprehensible. Yet, their integration into educational settings is not without its challenges, as we will examine in the subsequent discussion.

The potential limitations of multimedia learning tools must be considered as well. Issues like distractibility, technological constraints, and the risk of passive consumption of information are factors that educators and learners alike must grapple with. Understanding these limitations is vital to harnessing the full potential of multimedia in education.

II. MULTIMEDIA AND EDUCATIONAL TECHNOLOGY

2.1 What is Multimedia?

Multimedia is the media that uses multiple forms of information content and information processing (e.g. text, audio, graphics, animation, video, interactivity) to inform or entertain the user. Multimedia also refers to the use of electronic media to store and experience multimedia content. Multimedia is similar to traditional mixed media in fine art, but with a broader scope. The term "rich media" is synonymous for interactive multimedia.

2.2 Educational Technology

Multimedia technologies are tools that make it possible to transmit information in a very large meaning, transforming them into knowledge through leveraging the learning power of senses in learners and stimulating their cognitive schemes..Educational technology is the study and ethical practice of facilitating learning and improving performance by
creating, using and managing appropriate technological processes and resources [2]. It is most simply and contentedly defined as an assortment of tools that might prove helpful in student centered learning. It advocates the teacher becoming "Guide on the Side" rather than "Sage on the Stage"[3]. Educational technology also called 'Learning Technology', mainly comprise of the use of technology in the process of teaching and learning. Here the item technology does not only include the use of latest tools and techniques like laptops, interactive whiteboards, and smart phones; internet, Wi-Fi, and YouTube etc., although they are massively preferred by today's learners for their learning potential, but also encompasses efficient and enhanced learning management systems, schema of information dissemination, effective teaching and management of student masses, feedback mechanisms and performance evaluation methodologies etc.[4].

Inside the Educational Institution (schools, museums, libraries): this refers to all the tools that foster the value of lessons or visiting during the time that they take place. Here we mean "enhancing" as enhancing moments of learning for students or visitors: hypertexts, simulation, virtual cases, virtual reconstructions, active touch-screen, video, and audio tools;

Outside the Educational Institution: this refers to communication technologies such as Web, software for managing communities, chats, forums, newsgroups, for long-distance sharing materials, and so on. The power of these tools lies in the possibilities to interact and to cooperate in order to effectively create knowledge, since knowledge is a social construct (Nonaka& Konno, 1998; Von Foerster, 1988; Von Glasersfeld, 1988).

Behind these different applications of MET lies a common database, the heart of the multimedia system (Pearce, 1995). The contents of both applications are contained in the database, so the way that applications can use information recorded in the database is strictly conditioned by the architecture of the database itself.

III.   THE NEED OF MAKING MULTIMEDIA COURSEWARE

Besides being a powerful tool for making presentations, multimedia offers unique advantages in the field of education, also enables us to provide a way by which learners can experience their subject in vicarious manner. The key to provide this experience is having simultaneous graphics, video and audio, rather than in a sequential manner. Technology does not necessarily drive education. That role belongs to the learning needs of students. With multimedia, the process of learning can become more goals oriented, more participator, flexible in time and space, unaffected by distance and tailored to individual learning style, and increase collaboration between teachers and students. With multimedia, the communication of the information can be done in more effective manner and it can be an effective instructional medium for delivering educational information because it is enables the teacher to present the information in various media. Figure 1is shown the marriage of content and multimedia technology results in interactive multimedia materials which can be delivered to the students in teacher-centered, student-centered, or hybrid teaching and learning modes.
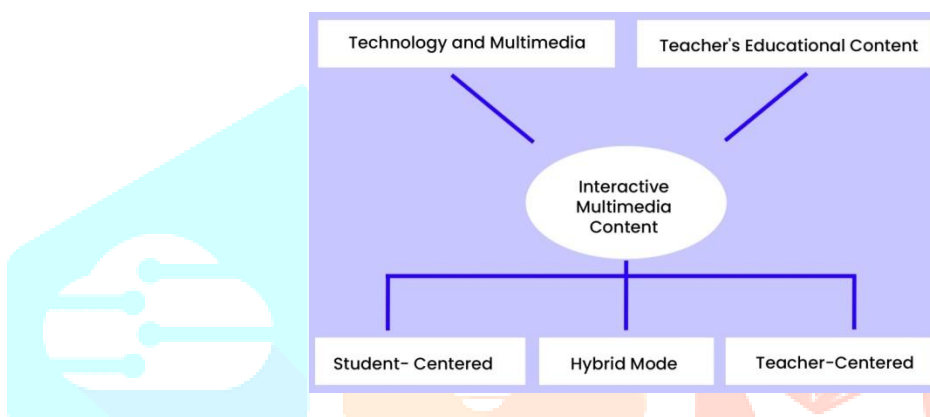

Fig.1:Using multimedia to represent content and delivering via various methods

In the teacher-centered mode, the teacher is the one in control of the information that is received by the students
and is responsible for how much information is being disseminated to them. The teacher-centered methods include presentations and demonstrations to process the information. Students are also able to retain and recall the information as well as obtain mastery in the subject manner with drills and practices, and tutorials, which are highly interactive. The multimedia courseware can also be packaged on the CD_ROM and delivered in a networked classroom leading to a teacher-centered mode where the courseware is opened on their computers and the students follow the teacher's lecture on their computers.
In the student-centered method, the students construct their own knowledge and bring authentic experiences into
the learning process with the teacher as the facilitator. The multimedia courseware content can also be packaged as a web file and delivered on the internet in a web browser can be result in online courses where the students access the courseware from a browser on their computers. The students are then free to engage in learning on their own time and space, and consequently, the learning mode is student-centered. This multimedia material can be used to foster team-processing and active learning as with collaborative and cooperative method. This encourages higher-level learning, increases comprehension and retention rates, and focuses on the total development of the student in self-accessed and self-directed learning.
In the hybrid mode, the teacher has the flexibility to incorporate the two teaching and learning approaches whenever they deem them useful, to increase and enhance their students' learning processes. Here, the same multimedia courseware content can also be packaged and delivered over satellite and broadband technologies for distance learning. Meanwhile, the student learns the materials on their own time and space, and interacts with the teacher via video-conferencing in real-time [5].

IV. USE OF MULTIMEDIA IN AN EDUCATIONAL SETTING

The use of multimedia in an educational setting offers numerous benefits to both educators and students. It leverages various forms of media, such as text, images, audio, video, and interactive elements, to enhance the teaching and learning experience. Here's how multimedia is used in educational settings:

Engagement and Motivation: Multimedia materials are inherently engaging. They capture students' attention and sustain their interest, making the learning process more enjoyable and motivating.

Improved Comprehension: Complex concepts are often better explained through multimedia. Visual aids, animations, and diagrams can help students visualize abstract ideas, processes, and historical events, facilitating better comprehension.

Catering to Diverse Learning Styles: People have different learning preferences, such as visual, auditory, or kinesthetic. Multimedia accommodates these preferences by presenting information in various formats, ensuring a more inclusive learning environment.

Interactivity: Many educational multimedia resources incorporate interactive features. Students can actively participate in activities, quizzes, simulations, and virtual labs. Interactivity promotes critical thinking and problem-solving skills.

Self-Paced Learning: Multimedia resources are often available online, allowing students to learn at their own pace. They can revisit content as needed, which is particularly helpful for individualized or remedial learning.

Accessibility: Multimedia materials can be designed to be accessible to students with disabilities. Closed captions, transcripts, and alternative text for images ensure that content is available to all learners.

Global Access: Multimedia resources can be accessed globally, breaking down geographical barriers and enabling students to learn from experts and institutions around the world.

Flipped Classrooms: Multimedia is often used in the "flipped classroom" model. Students review multimedia content before class, allowing class time to focus on discussions, problem-solving, and active learning.

Professional Development: Multimedia resources are valuable for teacher professional development. Educators can access webinars, online courses, and instructional videos to enhance their teaching skills and stay updated with educational trends.

Multimodal Learning: Combining text, images, audio, and video can reinforce learning by presenting information through multiple sensory channels, improving retention and understanding.

Real-World Application: Multimedia can bring real-world scenarios and case studies into the classroom, making education more practical and relevant.

Data Analytics: Many multimedia learning platforms provide data and analytics on student performance. Teachers can use this information to identify areas where students may need additional support.

Subject Variety: Multimedia is used across various subjects, from science and mathematics to history, literature, and art. It's adaptable to different educational levels and curricula.

Assessment and Feedback: Multimedia often includes built-in assessment tools, allowing students to test their understanding and receive immediate feedback. Teachers can use these assessments to gauge student progress.

Cost-Effective Learning: When compared to traditional textbooks or physical materials, digital multimedia resources can be cost-effective, as they can be reused and easily distributed.

V. MULTIMEDIA IN YOUR CLASSROOM

Technology continues to change the world around us. The academic world is no exception. Students and teachers everywhere are discoveringexciting and innovative ways to make learning more dynamic, longer lasting, and more applicable to the world outside the classroom. Table 1 presents some multimedia softwarefrom Sony Creative Software, that you can incorporatevideo, music, and audio into your existing curriculum.

Table 1: Sony Creative Software in Your Classroom

Multimedia	Benefits
Group video report	Foster team building and provide hands-on experience with new technology. Assign three to five students to a team and let each team choose a topic about which they can make a short video.
Enhance the school website	Enhancing with streaming video content. For example, students could create a video tour of the school complete with host/narrator and subtitles.
Video language lessons	Can help speed learning.
Slideshow presentation	Can be used for almost any subject and are easy to create using Sony video editing software. You can use slideshows to enhance your lessons, or ask students to deliver reports in slideshow format.
Multimedia portfolios	Show off a student work in a fresh, new way. For example to create a slideshow featuring their best work.
Podcasting	Is a method of communication allowing anyone to create audio files and post them on the internet for others to download?
Convert lessons to MP3	Students can listen to material more than once

VI. MULTIMEDIA EDUCATIONAL PROGRAMS

Multimedia educational programs are interactive and technology-driven tools designed to enhance the learning experience by incorporating various multimedia elements. These programs are used in various educational settings, from K-12 schools to higher education and corporate training.

Table 2 presents a critical study of a few multimedia educational programs.

Table 2 : Multimedia Educational Programs

Program	Benefit(s)	Multimedia Technology Used	Noticing
1. Heads Up (Health Educational and Discovering Science while unlocking potential)	To develop interesting in science and encourage students to enter academic pipeline to careers in health sciences	1) Video career stories of minority health scientists on DVD or taps. 2) Graphics and Animations during hands on activities. 3) Web based Resources. 4) Teacher resources following iterative review and feedback design process	The program presented in paper [7] results assures to reduce the achievement gap between white and non-Asian minority middle school students by representing life stories of minority scientists in a multimedia framework.
2. WIT (Williams Instructional Technology)	To develop high quality multimedia based projects to be used faculty in teaching	1) Print Publications to advertise WIT. 2) Presentation to share project experiences. 3) Daily messages on web to announce collection of project proposals. 4) Digital story telling workshop during training	The program presented in paper [8] has successfully proven the use of multimedia technology in training the interns, and facilitated the creation of projects that work in classroom teaching
3.TiM	To design, develop and to adapt computer games for visually impaired children	1) Tactile and sound interface for playing through interactive stories. 2) Use of concept keyboard. 3) Use of Joysticks to control sound interface	The project presented in paper [9] advocate the use of multimedia computer games for visually impaired children as an aid for their psychomotordevelopment and enhanced adaptability to human computer interface.

4.KAD (Kino-Ani-Drama and Animation Therapy)	To reduce stress related problems caused by excessive use of internet, mass-media and video games	1) Off-line Kino-Ani-Drama therapy including dance and drama therapy, music therapy and painting therapy. 2) Online animation therapy including 2D, 3D animation, Hypertext, virtual reality.	The program presented in paper[10] showed therapeutic resultsto the mind and body of stressedout net-generation caused by negative effect of compulsiveuse of media by constructivelyengaging them in media production like video, audio, animation, etc

VII. CONCLUSION

According to the paper,the changing role of education is currently being reinforced with the integration multimedia technology and this has led a new paradigm in education and the evolution of new concepts in content

development and a number of innovative methods in which information can be communicated to the learner. In

conjunction with the study of usefulness multimedia in different educational scenarios, the important point for future

research is that the time to come will surely promise the availability of multimedia technology to one and all, but its

usage should be limited to and in consideration with its pedagogical strengths, also given high importance of multimedia

from different fields of researchers backgrounds, divers view-points, and varying procedural methods. Hence the

multimedia community seems to be the perfect platform for bringing all those researchers and educators with different

backgrounds together in order to help improve multimedia based education and therefore teaching and learning in

general.

REFERENCES

[1]G. Friedland, W. Hurst, L. Knipping; "Educational Multimedia Systems: The Past, the Present, and a Glimpse into the future", EMME''07, Septemer,2007, Augsburg, Bavaria, Germany. ACM 978-1-59593-783-4/07/ 0009.

[2]R. C.Richey, "Reflections on the 2008 AECT Definitions of the Field," TechTrends. vol. 52, no. 1, pp. 24-25, 2008.

[3]M. Prensky, "The Role of Technology in teaching and the classroom," Educational Tecnology, Nov-Dec, 2008.

[4]S. Malik and A. Agarwal. "Use of Multimedia as a New Educational Technology". Int. Journal ofInformation and Education Technology, Vol. 2, No. 5, October 2012.

[5]M. Neo and T. K Neo "Multimedia Learning: Using Multimedia as a platform for instruction and learning in higher education". Multimedia University International Symposium on Information and Communication Technologies 2000 (M2USIC'2000), PJ Hilton, October 5-6,2000, PP S3-1.1 - 1.4.

[6]N. G. Murray, K. A. Opuni, B. Reininger, N. Sessions, M. M. Mowry, and M. Hobbs. "A MultimediaEducational Program That Increase Science Achievement among Inner-City Non-Asian Minority Middle-School Students". Academic Medicine. vol. 84, no. 6. pp. 803-811, June 2009.

[7]T. Murphy. "Williams Instructional Technology: Summer Students Working on Faculty Projects," in Proc. of 35th Annual ACM SIGUCCS fall Conference, Orlando, Florida, USA, October 7-10, 2007.

[8]A. Buaud, H. Svensson, D. Archambault, D. Burger, K. Miesenberfer, J. Klaus, and W. Zagler, "Multimedia Games for Visually Impaired Children, " ICCHP 2002, Lecture Notes in Computer Science, 2398, pp.173-180, 2002.

[9]S. H. Park, S. Y. Kim, J. H. J. Choo, W. J. Lee, and J. S. Kang, "Using New Media to Create Integrating Art Therapy, "in Proc. of SIGGRAPH Asia 2009,no. 14,200