

Use of Multimedia as a New Educational Technology Tool—A Study

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Abstract—In the current scenario of educational institutions, multimedia has dig up its own kind of space in some or the other way as a tool of educational technology. Multimedia has overcome the barriers of time and space and provides evidence to be accepted as an anytime and anywhere tool for educating multi-disciplinary masses. The process of knowledge acquisition becomes more efficient when the learners experience an event through a multimedia simulation. Multimedia technology empowers the educational process by means of increased interaction between teachers and the students. Apart from the fact that multimedia can provide educators and students with endless possibilities of quality teaching and learning, taking vital considerations of the pedagogical strengths and limitations of Multimedia, it can be used to its fullest potency, and reach the eminence of ‘New Educational Technology tool’.

Index Terms—Multimedia, educational technology, multi-disciplinary, pedagogy, constructivist learning environment.

I. INTRODUCTION

This paper presents a comprehensive study of selected papers that are pertinent to the use of Multimedia in Education, as well as lists down the various proposed multi-disciplinary educational frameworks and tools for the same. In this paper, a study of most commonly used methods and issues related to the use of Multimedia as a new education technology tool has been carried out and reported. It also presents a categorized listing of such papers, accompanied by annotations that describe the content of the papers and their relevance to the use of Multimedia in Education.

II. MULTIMEDIA AND EDUCATION

A. What Is Multimedia?

Multimedia is a melody sung in harmony with multi-channel and multi-modal bits of knowledge and creation. Sometimes it is as small as a rotating globe used as logo in an amateur’s website or is as huge as Xbox 360 games or DreamWorks’ Shrek series. Its ultimate role is to inform, educate and/or entertain all. Multimedia is all-pervading, thrilling and involving method of info-edu-tainment with

multiple facets and long lasting approbation.

B. Educational Technology

Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources [1]. It is most simply and contentedly defined as an assortment of tools that might prove helpful in student centered learning, problem based learning or case-based learning. It advocates the teacher becoming “Guide on the Side” rather than “Sage on the Stage” [2]. Educational Technology also called ‘Learning Technology’, mainly comprise of the use of technology in the process of teaching and learning. Here the term ‘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.

C. Multimedia Learning Environment

Multimedia provides a technology based constructivist learning environment [3] where students are able to solve a problem by means of self explorations, collaboration and active participation. Simulations, models and media rich study materials like still and animated graphics, video and audio integrated in a structured manner facilitate the learning of new knowledge much more effectively. The interactive nature of multimedia provides the room to enhance traditional "chalk-and-talk" method of teaching [4] with more flexibility to learners to adapt to individual learning strategy. It enables both the educators and learners to work together in an informal setting. The role of educators and learners are extended. Furthermore, it encourages and enhances peer learning as well as individual creativity and innovation.

III. MULTIMEDIA AND ITS PEDAGOGICAL STRENGTHS

Multimedia facilitates mastering basic skills of a student by means of drill and practice. It helps in problem solving by means of learning by doing, understanding abstract concepts, provide enhanced access for teachers and students in remote locations, facilitate individualized and cooperative learning, helps in management and administration of classroom activities and learning content, and simulate real life problem handling environments. Multimedia Technology is used and experimented by various educational institutions of all levels all over the world in their own designed modes.

Manuscript received April 10, 2012; revised June 19, 2012.

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IV. MULTIMEDIA IN EDUCATION: UNIVERSITIES APPROACH

There are two ways, multimedia education is imparted to the students by various universities / institutions: a) Teaching methodologies of multimedia content creation, which include imparting hands-on skills of software packages used for creation and authoring of multimedia content, and b) Employing interactive multimedia content and technology for effective teaching, which include the

various methods of engaged learning like multimodal interactive information delivery; and personalized and enhanced anytime-anywhere access of the content. Table I presents a few initiatives taken by various educational bodies to understand, implement and evaluate the type of multimedia required in the time to come so that it justifies its universal acceptance as a major tool of Educational Technology.

TABLE I: EVALUATION OF ROLE OF MULTIMEDIA TECHNOLOGY IN EDUCATION

Issue	Proposed Model/Solution/System	Annotations
Development and implementation of Australia's first undergraduate multimedia degree course at Griffith University	The article [5] discusses the three levels of educational requirements in Multimedia Education: <div style="border: 1px dashed black; padding: 5px; margin: 10px 0;"> <p>Authoring level: only involves creating multimedia content for a g</p> <p>Application level: focuses on creating the software components of the environments.</p> <p>System level: focuses on empowering students in creating the complete artificial environments and multimodal systems themselves.</p> </div>	This article [5] has presented an outlook of multimedia practice and research used to design and develop an undergraduate degree curriculum in multimedia to suffice future educational and industrial needs. It emphasizes the kind of multimedia education which is capable to enable students to create simulated, interactive, information spaces requiring the in-depth knowledge of multimedia computing and communication systems, understanding of computer hardware, software, and multimodal data processing technologies to provide quality solutions to novel problems, and not just learn content authoring using certain software packages.
Assist educators to choose between numerous educational Multimedia technologies.	Knowing that the technological availability of multimedia resources is possible, the pedagogical evaluation of multimedia is proposed to be done [6].	This paper [6] advocates the need of evaluation of the effectiveness of new multimedia technologies in classroom environment in the light of their contribution in the improved teaching and learning.
The future educational paradigm, the role and extend of the use of Multimedia in it.	FLiE (Flexible Local independent education [7].	This paper [7] proposes that the new futuristic educational Model FLiE, would allow flexible education and is supported by interactive communication tools authored by both teachers and students, and indulge them in life-long education.
To enable students to ask questions electronically and anonymously in class.	ActiveClass (A networked classroom technology) implemented on Undergraduate class in Computer Science at UC San Diego known as Active campus [8].	This paper [8] send regrets to the adoption of ActiveClass seeing unsatisfactory participation of students with varied reasons such as, unavailability of sufficient laptops, heterogeneous mass with diverse interests, engaging students into more irrelevant tasks while lectures and hence could not effectively augment the current classroom behavior as desired.
To provide inter-disciplinary knowledge and skills dealing with visual aesthetic understanding and communication, integrated with technological knowledge, in order to become effective and efficient employees in the information age.	Interdisciplinary Bachelor of Science degree in Interactive Digital Media at Northwest Missouri State University [9].	This paper [9] presents an interdisciplinary approach of Education which in-turn is developed and maintained by three departments, Art, Computer Science/Information Systems and Mass Communication to provide students various courses on Interactive digital media, Computer science programming, new media and visual imaging. The course has been designed with the industry input considering the upcoming demands and curriculum is modified time to time to justify its purpose.

V. MULTIMEDIA EDUCATIONAL PROGRAMS: MULTI-DISCIPLINARY APPROACH

Various Multimedia educational programs have been designed, developed and implemented as a solution to observed problems in multiple disciplines. Various combinations of Multimedia content and methodologies are

being used as a try to solve the issues. The various organisations and institutions all over the world are dedicatedly working towards implementation of multimedia and exploring its multi-disciplinary utility. Table II presents a critical study of a few Multimedia Educational programs.

TABLE II: EVALUATION OF MULTI-DISCIPLINARY MULTIMEDIA EDUCATIONAL PROGRAMS

Program	Target Users	Goal(s)	Multimedia Technology used	Annotations
HEADS UP (Health Education and Science while unlocking potential)	Inner-City Non-Asian Minority Middle-School Students in the US	To develop their interest in science and encourage them to enter academic pipeline to careers in health sciences	<ol style="list-style-type: none"> (1) Video career stories of minority health scientists on DVD or VHS cassette tapes. (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 [10] results assures to diminish the achievement gap between white and non-Asian minority middle school students by presenting life stories of minority scientists in a multimedia framework.
WIT (Williams Instructional Technology)	Summer Technology student interns working on faculty proposed projects	To develop high quality multimedia based projects to be used by faculty in teaching	<ol style="list-style-type: none"> (1) Print Publications to advertise WIT. (2) Presentations to share project experiences. (3) Daily messages on web to announce collection of project proposals. (4) Digital Story Telling workshops during training. 	This summer technology program [11] has successfully proven the use of Multimedia technology in training the interns, and facilitated the creation of projects that work in classroom teaching.
ACALPA (Affective Computer-Aided Learning Platform for Children with Autism)	Implemented in a specialized school for people with autism.	To examine and facilitate the educational procedure for people with autism.	<ol style="list-style-type: none"> (1) Everyday use objects, colors and words to help sustain user's interest during game. (2) Avatar driven instructions or synthesized speech in autistic person's native language. (3) Feedback through Avatar's visual expression of emotions. (4) Personalized instructions and the various difficulty levels for different users. 	This Multimedia system [12] provide the interactive modules to support techniques and methods that are used in autistic persons' education such as TEACCH, which involves a structured teaching approach and the use of visual materials especially targeting to the person's visual processing strengths
KAD (Kino-Ani-Drama) and Animation Therapy	Implemented on the children and adolescents of south Korea	To reduce stress related problems caused by excessive use of internet, video games and mass-media	<ol style="list-style-type: none"> (1) Off-line Kino-Ani-Drama Therapy including Dance and Drama Therapy, Music Therapy & painting therapy. (2) Online Animation Therapy including 2D, 3D Animation, virtual reality, Augmented reality, hypertext etc. 	This multimedia therapy program [13] showed therapeutic results to the mind and body of stressed out Net-generation caused by negative effect of compulsive use of media by constructively engaging them in media production like videos, animations etc.
TiM	3-10 yrs, old, blind or having severe visual impairment	To design, develop and to adapt computer games for visually impaired children	<ol style="list-style-type: none"> (1) Tactile and Sound Interface for playing through interactive stories. (2) Use of concept keyboard. (3) Use of Joysticks to control sound interface. 	The Multimedia project presented in paper [14] advocate the use of Multimedia computer games for visually impaired children as an aid for their psychomotor development and enhanced adaptability to Human computer Interface.

VI. CONCLUSION

In this paper, a study has been carried out to analyze the reverence of multimedia in various disciplines of current education system. From the review of literature in reference with a variety of university approaches, it has been learnt that multimedia has enormous potential to impart flexible, multi-modal, life-long education to heterogeneous mass learners. The Multi-disciplinary nature of multimedia makes it increasingly popular among people from diverse domains. The literature study clearly demonstrates its qualifications as a vast source of customized learning environments, to accommodate varied behavioral problems like confidence building and stress reduction. Multimedia used in right direction has also succeeded in psychomotor development

and strengthening of visual processing of the intended users.

In conjunction with the study of usefulness of 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. The above studies have clearly indicated that even if the networked classroom technology is made available to the students, there were many other pedagogical issues because of which the students' interest and interaction in the class room could not be increased. More research work is required in the area of multimedia pedagogy so that the design, form and content of Multimedia is such that it does not hinder the usual educational process and supplements it with more info-edu-tainment.

REFERENCES

- [1] R. C. Richey, "Reflections on the 2008 AECT Definitions of the Field," *TechTrends*. vol. 52, no. 1, pp. 24-25, 2008.
- [2] M. Prensky, "The Role of Technology in teaching and the classroom," *Educational Technology*, Nov.-Dec. 2008.
- [3] M. Neo and T. K. Neo, (2009). Engaging students in multimedia-mediated Constructivist learning – Students' perceptions. *Educational Technology & Society*. [Online]. vol. 12, no. 2, pp. 254–266. Available: http://www.ifets.info/journals/12_2/18.pdf
- [4] M. Neo (2007), Learning with Multimedia: Engaging Students in Constructivist Learning. *International Journal of Instructional Media*. vol. 34, no. 2, pp. 149-158.
- [5] N. R. Gonzalez, G. Cranitch, and J. Jo, "Academic directions of multimedia education," *Communications of the ACM*. vol. 43, no. 1, January 2000.
- [6] G. Krippel, A. J. McKee, and J. Moody (March 2010). Multimedia use in higher education: promises and pitfalls. *Journal of Instructional Pedagogies* [Online]. Vol. 2. pp. 1-8. Available: <http://www.aabri.com/manuscripts/09329.pdf>
- [7] A. Radford. (2007). The future of Multimedia in Education. *First Monday Peer-reviewed on the internet*.
- [8] L. Barkhuus, "Bring Your Own Laptop Unless You Want to Follow the Lecture: Alternative Communication in the Classroom," in *Proc. of 2005 international ACM SIGGROUP Conference on Supporting group work*, November 6–9, 2005.
- [9] C. Spradling, J. Strauch, and C. Warner, "An Interdisciplinary Major Emphasizing Multimedia," *ACM SIGCSE Bulletin - SIGCSE 08*, vol. 40, no. 1, March 2008.
- [10] N. G. Murray, K. A. Opuni, B. Reininger, N. Sessions, M. M. Mowry, and M. Hobbs. A Multimedia Educational Program That Increases Science Achievement among Inner-City Non-Asian Minority Middle-School Students. *Academic Medicine*. vol. 84, no. 6. pp. 803-811, June 2009.
- [11] 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.
- [12] E. I. Konstantinidis, A. Luneski, and M. M. Nikolaidou. "Using Affective Avatars and Rich Multimedia Content for Education of Children with Autism," presented at Petra'09, Corfu, Greece. June 9–13, 2009.
- [13] 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: Animation Therapy," in *Proc. of SIGGRAPH Asia 2009*, no. 14, 2009.
- [14] A. Buaud, H. Svensson, D. Archambault, D. Burger, K. Miesenberger, J. Klaus, and W. Zagler, "Multimedia Games for Visually Impaired Children," *ICCHP 2002, Lecture Notes in Computer Science*, 2398, pp. 173–180, 2002.