Scope of Multimedia in Science Education

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Abstract:

The scientific and technological developments which are going on with a rapid pace complemented with the changes in the structure of the society influence the educational system in general and instructional method in particular. Such a growing trend leads to new attempts and innovations in the educational arena in terms of the teaching learning processes. Among these new attempts, one is to work for the better utilization of computers as an instructional tool; as the potential of computers as an effective communication and individual learning tools has been well established. The integration of computer technology in education, is gaining popularity these days for the strengthening and betterment of the teaching learning system with the probability of increased student achievement. The influence of computer technology has not left science education unaffected. It has revolutionized the scope of science teaching and learning tremendously. In the contemporary Science education the term Multimedia is becoming more and more popular term. Multimedia instruction is a well-established means of instructional delivery in the Sciences and is often used to complement or blend with traditional didactic elements, or replace other 'traditional' teaching methods altogether. The use of mechanical devices as educational tools emerged in the 1950s with Skinner's "teaching machine", a machine that allowed students to respond to questions (Skinner, 1960), and later the notion of computers

as educational tools became established. The journey of computer as an educational tool has gained its supremacy with the advent of multimedia. Being very well aware of the enormous scope of Computer as an educational tool government has also taken many initiatives to utilize the potential of computers. The present article discusses in detail government's initiatives to promote computer as an educational tool and the scope of multimedia in Science education in present scenario.

Key words: Multimedia, Science Education, Computer as an Educational Tool.

Introduction

The integration of technology in education is a growing phenomenon. A tremendous amount of time and money has been devoted in making technology accessible to students with the promise of increased student achievement. Computers are used as teaching tools and a means for improving work product. The connection between students' use of technology and the resultant learning needs to be established.

Parallel to the development of these devices, which represent the most important components of the information and communication technologies, science education in general do make use of such tools to improve learning practice. When the Indian education system is examined, it is observed that face-to-face instruction is the most commonly used instruction practice. This system is mostly based on a teacher centered learning atmosphere where the focus of the instructional activities is learning. Thus the student can have problems in assigning meaning to information, understanding the content as a whole, locating new information in their schema and transforming this information to knowledge.

Computers in Educational Arena

The present age has brought an explosive growth in both the number and variety of application of computers and relevant technology used in the classroom. The use of computers can improve-teaching and learning, strengthen teacher professional development, support broad educational reform, enhance school community partnership and improve school management. Around 1980 computers were used primarily for three tasks: to teach student about computers, to teach programming and for drill and practice program.

Education systems around the world face formidable challenges that are because of conventional strategies. Now after a long way of struggle, computers are finally able to offer opportunities to significantly improve teaching & learning strengthen teacher professional development and support broad educational reforms. One hallmark example is of the 10 year long Apple Class-room Of Tomorrow (ACOT-1996). ACOT team examined the effect of computers in teaching and learning and found that 'students' behavior and attendance improved along with their attitude towards themselves and towards learning. Computer has been proved an efficient and effective tool for a number of purposes in school. It is a modern tool for improving the quality of teaching and learning. Usage of computer brings the entire world into the classroom. It is very clear that computer is useful and versatile tool. It can be used to help solve the problems and accomplish the tasks. Computers are used in different context… Using computer as a tutor can be effective way of infusing thinking skill into subject area teaching and learning. This is because with the right teacher input and software design around computers can turn the use of reasoning skill into learning outcome. Software can be designed to initiate resource and frame a discussion just as a teacher can.

Government's Initiatives to Promote Computer as an Educational Tool

Government of India came up with the **CLASS** project during the year 1984-85, which generated increasing awareness of computer literacy among the stakeholders. It was introduced initially as a pilot project under which a total of 12,000 micro-computers were distributed to secondary and senior secondary schools. The provision related to computer education, under the NPE-1986 and POA- 1986 remained intact in the NPE-1992 but in revised NPE more emphasis was given for inclusion of computer in education. Later on this project was adopted as a centrally sponsored scheme during the 8th plan (1993-94).

In July 1998 Prime minister constituted an IT Task Force with **Vidyarthi Computer Scheme, Shikshak Computer Scheme and School Computer Scheme** with attractive packages. The CLASS project was modified during 2001-02. But Prof. M. Mukhopadhyay observed that in the class project computers were provided with a few CAI softwares while colleges were provided with computers without any software. Lack of provision of suitable educational software has led to under or no utilization of computers which turned them into mere a display item.

World links India program was launched in January 2002 to provide school connectivity, basic computer literacy and teacher professional development program initiated by Intel Corporation.

Another initiative taken by government of India is the **Information and Communication Technology (ICT) in Schools Scheme**, which was launched in December, 2004. This scheme aims at to provide opportunities to secondary stage students to mainly build their capacity on ICT skills and make them learn through computer aided learning process. The Scheme acted as a major catalyst to bridge the digital divide amongst students of various socio economic and other geographical barriers. Under this scheme sanction has been

given to Government and Government aided secondary and higher secondary schools for establishing and using infrastructure for ICT based teaching learning processes.

On September 30, 2008 under the *(ICT) in Schools* scheme, a round table discussions and consultation was organized to promote, reenergize the existing scheme and to bridge the digital divide. In this conference it was also discussed that additional educational content on CDs for embellishing classroom teaching will also be made available. A need was felt to expand the outreach of the scheme so in July 2010 **revised ICT at School Scheme** was introduced which focuses on coverage of more schools, development and sharing of appropriate e-content and capacity building of teachers.

Above schemes and earnest effort of the central Government, State Government, NGOs and almost at all the school level bring forth the fruitful results. Computers are being used as a personal productive tools. This can bring a new way of knowing and research in schools. It has shrunk our world and this transformation has fuelled by rapid progress in computer related technologies. The computer role as a "mind" tool has further augmented the change in the information age. The information age has challenged our education system. It has an impact on the functions of teacher education and curriculum development. It has also affected decision-making process that determines how school resources are allocated. A new paradigm is evolving in the educational arena and changing how teaching is delivered and learning is processed.

Introduction of Multimedia in Science Education

One of the uses of computers in school is in the teaching and learning of science subjects. Computer technology has revolutionized the scope of science teaching and learning tremendously. In the contemporary Science education the term Multimedia is becoming more and more popular term. Multimedia instruction is a well-established means of

instructional delivery in the sciences and is often used to complement or blend with traditional didactic elements or replace other 'traditional' teaching methods altogether. The use of mechanical devices as educational tools emerged in the 1950s with Skinner's "teaching machine", a machine that allowed students to respond to questions (Skinner, 1960), and later the notion of computers as educational tools became established. The journey of computers as educational tools has gained its supremacy with the advent of multimedia. Various researchers have expressed that multimedia technology adds new dimension to learning experiences because concepts become easier to present and comprehend when the words are complemented with images and animations.

Scope of Multimedia Resources and Instructional Packages in Science Education

The Science curriculum over the years has been transacted by lecture method, which makes instruction teacher-centered. Hardly can, some of complex content in Science 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 been a major source of student's poor academic performance in science. Most teachers still prefer using the 'chalk and talk' method in classroom teaching learning process. A good deal of expected learning outcomes is not realized in Science in our senior secondary schools as a result of non-availability of instructional materials as well as lack of effective utilization of appropriate teaching materials. In using technology to mediate the learning experience, multimedia system offers tremendous potential. This is based on the recognition that the use of audio, video and text technologies provide stimuli-rich information in the learning process.

So it is well understood that in the present scientific and technological age the conventional method is not sufficient to

arouse interest among the students and does not come up to the intellectual, psychological and emotional needs of the students in the new millennium. One hour lecture, which consists purely of a verbal presentation, is seldom effective in holding attention, stimulating interest or encouraging student to analyze, evaluate and think critically. The traditional method of teaching is based on giving information as bits. It includes rote memorization of concepts, facts and principles, which do not realize objective of teaching Biology. Teaching strategies play an important role in enhancing the learning abilities of the students. So in this world of science and technology, it is not possible for a single method, technique or medium to make teaching learning process effective and to fulfill the needs of pupil and society. The involvement of more than two media of communication in instructional procedure can bring fruitful results.

It has to be lamented however that instruction in the secondary and higher secondary classroom continues to be dominated by teachers talk, minimum student participation and teacher control as is evidenced by a number of research studies. New interesting and innovative methods should be followed for effective teaching. For qualitative improvement in teaching learning process, Multimedia can prove as big breather as it is capable of sustaining the interest of students, through visuals and audio inputs. It also brings the element of outer world into the classroom. It can also help students in understanding the complex concepts in a very simple way.

Although multimedia as a tool cannot replace hands-on learning, it can enhance and strengthen the impact of activities in the field and in the science classroom. Various researchers have conducted experimental studies related to the effectiveness or impact of multimedia learning packages on students achievement like; **Sindhi (1996)** prepared a multimedia package for the teaching of physics in standard XI and found that teaching through multimedia package is more effective and resulted in better retention of learning in

comparison to conventional method of instruction; **Jayaraman (2006)** found that the computer based Multimedia Learning Packages were effective on performance and behavioural outcomes of students of different age groups; **Singh (2010)** found a significant effect of multimedia program on students achievement irrespective of sex; **Pal, Sana and Ghosh (2012)** concluded that computer assisted multimedia courseware facilitates students learning in Physical Science better than the traditional chalk and talk method; **Rani (2012)** concluded that the E-Content has improved Science Achievement significantly higher in comparison to Conventional Strategy etc. Findings of all these empirical researches clearly show that multimedia technology and multimedia packages have a tremendous scope in the field of science education. Various dry and uninteresting concepts of any branch of science can be well explained with a correct mixture of pictures, graphics, animation, sound and text; with the technology what we call the multimedia, a combination of multiple media. Life processes can be very well explained with the help of animated pictures. In this way, the students feel more engaged and engrossed and the learning is long lasting as the students are using all of his/her senses.

Students can also be engaged with digital media tools, such as photo-sharing, video-publishing and mapmaking programs, to give them opportunities to demonstrate their mastery of a concept and simultaneously reinforce their learning skills by helping them create their own content.

The use of multimedia resources as part of a core Science curriculum can:
- ✓ Visually demonstrate complex scientific ideas and concepts.
- ✓ Instill a sense of wonder and excitement in students about the world around them by visual impact.
- ✓ Present local, relevant case studies to enhance the knowledge and concepts.

- ✓ Provide examples of real people practicing science from all around the world.
- ✓ Generate student interest in science careers.
- ✓ Offer current research, theories and perspectives on a topic.
- ✓ Promote 21st century skills, including critical thinking, problem solving and communication skills.
- ✓ Provide a common experience shared by all students.
- ✓ Give participation experience in interactive multimedia.

Functions of Multimedia:

- **To Develop Mastery Learning:** It is an immediate need of time to incorporate good quality multimedia packages in today's science classrooms. Multimedia packages can be used to develop active and mastery learning. In this learning situation, there is active participation on the part of the learner as opposed to passive learning listening to lectures and demonstrations.

- **To Stimulate the Students Mind:** Multimedia also can stimulate the students mind and encourage learning through all senses because in multimedia we can combine so many media together.

- **To Promote Self Learning:** Added advantage of Multimedia is that it is nonlinear and interactive in nature. The interactive nature is considered to be the most important feature as it supports self learning. The interactive multimedia enhances effective self-learning among students. Multimedia has enormous potential from the point of view of self-based learning and it can serve as an independent complementary tool for enhancing the learning process.

- **To Improve Quality of Education:** Multimedia holds greater promise in enhancing learning as well as in improving the quality of education. Multimedia enables

students get a live vision of life's aspect and scientific factors (Lu 2008). Any diagram can be explained in detail with 3D effect. It helps the student to understand the lesson clearly.

- **To Promote Flexible Learning:** Multimedia ensures flexible learning according to the learners pace and need. In this flexibility is recognized in the level of access to courses/ content, the place of entry to, exit from course, the place, time and place of study; the form and pattern of interaction among learners, teachers and resources, the type and variety of resources to support study and communication; the goal or outcome of the educating process and the method used to measure achievements and success.

Conclusion:

Multimedia technology has become more and more popular after computers have been established as educational tools. More appropriately we can say the advancement in the computer technology have popularized the multimedia technology in education, as computer and internet have become widely accessible. It has opened a new dimension in teaching technology. Science being a very important subject often suffers dryness of concepts. These complex concepts of science cannot be taught effectively by mere using books, blackboard or charts. Some topics need real experience. But it is not at all possible or more appropriately feasible to give real life experience for every concept, like biological processes, functioning of different organs etc. In such cases multimedia is like a boon to science students as by using this technology they can have animated explanations with self explanatory pictures supported with videos which can give a clearer picture of the topic and its effect will be long lasting. So we can conclude that multimedia has enormous scope in science education.

REFERENCES

Agarwal, Y. P. and Mohanty, M. (1998). Effectiveness of multimedia programmed learning and tracitional methods of teaching: A much analytical study of Indian researchers. *IER*, Vol. 34(2).

Aggarwal, J. C. (2007). Essentials of Educational Technology – Innovations in Teaching and Learning. New Delhi: UBS Publishers Distribution PVT Ltd.

Anboucarassy, B. (2010). Effectiveness of multimedia in teaching Bological science to IX standard students. *Edutracks*, 9 (5), 37- 38.

Arulsamy, S. and Kumar, P. S. (2004). Interactive Multimedia in Teaching and Learning: *University news*.

Baugui, S. (1998). Reasons for Increased Learning using Multimedia, *Journal of Educational Multimedia and Hypermedia*, 7(1), 3-8.

Frear, V. and Hirschbuhl, J. J .(2000). Does interactive multimedia promote achievement and higher level thinking skills for today's science students?. *British Journal of Educational Technology*. Vol 30 No 4 .

Garg and Panda (2005). Interactive multimedia on distance and online learning; *Indian Journal of Open Learning*. 14(1), 97-98.

Mayer, R.E. (1999). Multimedia aids to problem-solving transfer. *International Journal of Educational Research*, Vol. 31, 611-623.

Nimavathi, V. & Gnanadevan, R. (2008). Effectiveness of multimedia programme in teaching science. *Edutracks*, Vol. 7 (8), 27-29.

Pal, S., Sana, S. and Ghosh, A. K.(2012). Influence of Interactive Multimedia Courseware: a Case Study among the Students of Physical Science of Class VIII. *Bhatter College Journal of Multidisciplinary Studies,* Vol. 2 retrieved on January 12, 2013 from

http://bcjms.bhattercollege.ac.in/interactive-multimedia-courseware/

Rani, S. (2012). Using E-Content In Science Class: The Effect Of Treatment, Gender, And Their Interaction On Science Achievement. *Indian Journal of Applied Research* , Vol. 1, Issue.7 .

Reddy, G. L. and Ramar, R. (1997). Effectiveness of Multimedia Instructional Strategy in teaching science to slow-learners, *Journal of Indian Education*, Vol. 23(2), 50-59.

Sharma, A. (2011). Information, Communication and Educational Technonogy. Jalandhar: Amit Prakshan.

Sidhu, S.M. and Ramesh, S. (2006). Multimedia Learning Packages: Design, Issues and Implementation Problems; *Malaysian Online Journal of Instructional Technology*, Vol. 5, No. 1, 43-56.

Singh, Y.G. (2010). A study of effectiveness of multimedia programme in teaching Biology. *International Research Journal*, Vol. 1 (11).

Yadav, V. (2011). Using Multimedia in Education, New Delhi: Pragun Publications