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Training Teachers for Integrating Technology into Teaching: A Need of Time

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Abstract: This paper presents a research conducted for need assessment and development of an interactive CD for Mathematics teaching at Grade 3. The study was comprised of two stages. Need assessment was the first stage, in which a questionnaire was formulated to understand the problems faced by teachers during the teaching and learning process of mathematics and to analyze the need of teaching mathematics through computer. Data was collected from 30 Math teachers - 15 from public and 15 from private sector schools, who use Punjab Text Book for Math teaching at Grade 3). The second stage of study was the development of interactive CD using different graphic softwares. The CD contains the concepts like place value, roman numbers, even and odd numbers, fractions, addition, subtraction, multiplication, division and money. Development of CD-I is the one step to make teachers able to build such teaching material, which is in accordance with their own classroom needs. It is recommended that traditional method of teaching should be upgraded with integrating cutting edge technology of computer, and teacher training programs should include computer education. Through inservice training programs, teachers should be equipped with computer skills.

Keywords: challenges, novice researcher, teacher as researcher

Introduction

Education encompasses teaching and learning specific skills, and also something less tangible but more profound: the imparting of knowledge, positive judgment and well-developed wisdom. The human nature got all the glory through the education, so the process of quality education is as vital as blood for life. Since the time of Socrates various means of teaching have evolved and with the development in technology and its integration in the educational process, varying instructional media like boards, graphic aids, non-projected aids and still projected aids were developed and were being used in the educational settings at various levels. The purpose of using so many different technologies is to make the learning and teaching process effective and long lasting. The

advancement and improvement in the technology have left its mark on every field and sphere of daily life in a very efficient and effective manner. Computer can perform complex calculation, store huge amount of data and process large volumes of data at very high speed and with great accuracy (Capper, 1985). Computers are taking place everywhere and particularly helping our educational process to be speedier and taking out burden of the teacher.

Educational technology

Educational technology is the application of scientific knowledge about human learning to the practical tasks of teaching and learning (Heinich et al, 1993). In other words, it is the application of scientific knowledge (strategies and techniques) to solve instructional problems. It is an attempt to bring about more effective instructions, based upon a systematic way of designing, carrying out and evaluating the process of teaching and learning, based upon research in learning and communication. An important aim of educational technology is to promote an educationally constructive interaction between the new facilities and other elements in educational theory and practice.

Educational technology is concerned with the application of modern skills and techniques to the requirement of education and training. This includes the facilities of learning by manipulation of media and methods and control of environment in so far as this reflects on learning (Wade, 1998).

Ways of using computers in learning

There are different kinds of learning activities involving computers, as Kulik and Bangert point out in their research summary(1985). Computer-based education(CBE) and computer-based instruction(CBI) are the broadest terms and can refer to virtually any kind of computer use in educational settings, including drill and practice, tutorials, simulations, instructional management, supplementary exercises, programming, database development, writing using word processors and other applications. Computer-assisted instruction (CAI) is a narrower term and most often refers to drill and practice, tutorial, or simulations activities offered either by themselves or as supplements to traditional teacher directed instruction. Computer-managed instruction (CMI) refer either to the use

of computers by school staff to organize student data and make instructional decisions or to activities in which the computer evaluates student's test performance and keep record of their progress. Computer-enriched instruction (CEI) is defined as learning activities in which computer generate data at the students request, execute programs developed by students or provide general enrichment in relatively unstructured exercises designed to stimulate and motivate students. (Kulik, 1985)

Computer-Aided Instruction (CAI)

CAI can be described as computer hardware and software that is designed to assist both teacher and students in the learning process. It includes several types of systems that are tailored to different teaching methodologies. CAI's roots go back to the 1950's when the first computer programs were developed. CAI was primarily used as a means of delivering instruction in place of the regular teacher or as a drill and practice-type of supplement to regular instruction. Research on CAI has repeatedly shown significantly higher gains in academic achievement across all content areas (Kenzie et al 1992). Modern implementation of CAI includes more advanced hardware and software technology that allows for greater student interaction and greater stores of information (Christmann et al 1997). According to Rasmussen(1996), one of the most powerful features of CAI is its capacity to individualize instruction to meet the specific needs of learner. Self-paced instruction, the ability to present content in a variety of ways (text, audio, video and graphics) and features such as hypertext, make CAI an effective learning medium. The use of CAI in classroom has increased greatly over years. As schools face continually growing problems with class sizes and heavier workload, educators are looking at CAI as a means of enhancing instruction. CAI can be a motivator to encourage students who have low levels of intrinsic motivation for learning a particular subject (Kinzie, 1992). Instructional or CAI software teaches specific skills and knowledge, often narrowed to a specific content area and grade range. It is in contrast to tool software that can be used in general to help students through problem processing at any grade level and in ay content area, such as: word processors, newsletter programs, spreadsheets, databases, audio-video editors, presentation programs (power point), web browsers and logo etc.(Poole, 1998)

Classification of CAI

- **Drill and Practice**

  Drill and practice assumes that the skills have previously been presented and that further practice is necessary for mastery. It has great value for remedial learning.

- **Tutorial**

  Tutorial activity includes both the presentation of information and its extension into different forms of work, including drill and practice, games and simulation. It enables students to learn new material at their own pace.

- **Games**

  Games software creates a content to achieve the highest score and either beat others or beat the computer both.

- **Simulation**

  Simulation software can provide an approximation of reality that does not require the expense of real life or its risks.

- **Discovery**

  Discovery software provides a large database of information specific to a course or content area and challenges the learner to analyze, compare, infer and evaluate based on their exploration of data.

- **Problem Solving**

  Problem-solving software teaches specific problem solving skills and strategies. Several studies indicate that not only students learning rate is faster with CAI but they retain the information longer(Kulik, et al, 1994)

Benefits of technology to teachers in this era of Globalization

Technologies are not only tools, but also powerful ones. They have the potential to contribute to different facets of educational development and effective learning: expanding access, promoting efficiency, improving the quality of teaching, vitalizing management systems, boosting possibilities for lifelong learning. One of the most powerful reasons for considering using technology in an education system is that it put learning in hands of user. It facilitates individualizing curriculum, permits learners to

dictate the pace of learning, and widens sources of information. Technology promotes active learning and allows interaction between peers and mentors. The technology allows faculty to incorporate new information and updated learning materials, and it enables immediate and rapid transfer of information pertaining to the administration of a course or program of study.

According to Poole (1997), communication technology is now pervasive, easy to use, and relatively inexpensive compared to just few years ago. Computers networked over communications lines are removing the concept of the closed classroom opening up the students and teachers to the global community of their peers. Examples are e-mail, Bulletin Board Systems(BBH), Voice messaging, file exchange, local and online data retrieval and video conferencing etc. Through this teachers can share lesson plans with other colleagues. Students from all over world can undertake joint programs, exchange findings, analyze data collectively, and draw reasoned conclusions.

The use of technology, especially in support of distance education activities, adds enormous value to the training. Where the infrastructure exists, connectivity costs are subsidized, the opportunity to create virtual online learning communities of teachers within nations and across regions exists. Such learning communities' enable and empower trainee and practicing teachers to share experience, curriculum, learning materials, lesson notes and collaborative programs.

According to (Pandey, 2003), information explosion estimated that the total amount of information doubles every four to five years. The total of information available to an undergraduate in 1997 was less than 1% of what will be available to a student in 2050. Therefore, teachers have to become expert in helping learners to navigate through the sea of information rather than attempt to be effective transformers of that information into knowledge for the learners. Technology is crucial in coping with the explosion of knowledge over the lifetime of the learner, otherwise people's knowledge becomes obsolete and countries become marginalized.

Teaching of Mathematics

We think the key strategy of mathematics teaching should focus on keeping the students' interest in mathematics. If the students are interested in learning mathematics,

then the teacher's task becomes easier. But the traditional teaching methods pay more attention on teachers. We may call it teacher-centered teaching.

Conventionally, mathematics teachers give lectures when they teach their classes. They believe that this is a good way to transmit knowledge. In a traditional classroom setting, the teacher begin class by reviewing, then he teaches the new lesson, and finally he gives a take-home assignment. Some lectures begin by answering questions from homework or from the classroom. The student watches, listens, takes notes and then copies what the teacher does in their assignments. If the students have difficulty in doing the assignment, they have no way to get help. This conventional method is often boring for students because their only job in the classroom is to passively sit and watch the teacher work mathematics problems on the board and then copy what the teacher did. Few teachers use learning aids to teach mathematics. The fatal shortcoming of the above method is that it diminishes the students' interest. It makes the students feel that mathematics is pointless and has little value to them in real life. It becomes a subject they are forced to study, but one that is useless to them in real life. In the traditional classroom setting discussed above, both students and teacher are often frustrated because the students' individual needs are not met. But today's teacher does not consider the student as vessel waiting to be filled up with facts. He/She helps the child to learn and realizes that to teach is to nourish or cultivate the growing child or to give him intellectual exercise or to train him in the horizontal sense of directing or guiding his growth. The modern teacher sees education as a process of interaction between the child and its environment. They have realized the constant influence of communication media outside the classroom upon the student (Anand, 1987).

Mathematics teaching and Computers

Blackboards and chalk are no longer the sole technology available to the mathematics teacher. In many classrooms, students might be expected to learn using computers, calculators, film, television, video and many other media. However, very often technology is introduced into mathematics classrooms without due consideration of its role and its impact on learning and teaching. The subject of mathematics is usually treated as rough and hard, and students as well as teacher take it boring to teach. The

interactive material can make it fun and enjoyment to taught and learn. Drill and practice of mathematics concepts via computers is very common. However, problem solving may be the key to teaching mathematics and any proper use of computers in the classroom can focus on the thinking skills (Thomas and Kobayashi, 1997). There are a variety of ways a mathematics teacher can make use of computer for enhancing teaching and improving learning effectiveness (McCoy, 1996).

Teacher Education

In any system of education, teachers occupy the central position. The competence and quality of teachers determine the heights to which an education system can rise. Today's teachers have to train children to lead a life in 21st century. The future of education depends directly upon the quality of the intermediary inventive minds of teachers and their ability to invent and innovate. In this era the role of instructional technology assumes vital importance. Teachers need to acquire media competency in addition to their usual instructional skills.(Singh, 2006). Today in every field of education, computer technology has made its place remarkably. Therefore, it is very important for a teacher to change his / her traditional practices and move towards the modern implications of technology in education. To attain this objective, computer technology in teacher education institutes are the key to make student teachers competent and to make teaching learning more interactive.

Use of Compact Disk (CD) technology in education

The compact disk as compared to a floppy disc, which holds 1.44Mb of data, a CD can store 650 Mb of computer data. Compact disk technology has many uses in education, including information retrieval, interactive audio and interactive multimedia programs. The compact disc read only memory allows huge amount of information to be stored on one disk with quick access to the information. Publishers have put complete encyclopedias, which could fill more than a dozen floppy disks, on one compact disk (CD). Getting the material ready to make CD can be expensive and time consuming but it yields in terms of better learning and teaching. Students and teachers can access information quickly and efficiently for use in and out of the classroom. The CD-ROM is becoming attractive alternative for large class size where individual attention cannot be

given to every student.

The most recent advancement in CD technology is the development of the CD-I(compact disk-interactive). This technology includes digitized sound, compressed video, animation and possibly text to create a multimedia platform for interactive program. Low cost, simple installation and ease of use make CDs a smart choice for kindergarten students or adult learners. Hundreds of educational titles in science, history, grammar and literature utilize CD's interactivity feature, which makes the experience more effective than static displays because participatory learning results in higher understanding and retention (Roblyer,1997). The production of interactive CD helps teachers to prepare their own technological material for teaching as compared to the CDs available in market, which are expensive and are not in line with the demand and environment of their own classroom.

Method

The study was aimed at need assessment and developing an interactive CD of Mathematics of Punjab Textbook Board for grade three, which could be helpful for teaching learning process. A purposive sample of the study comprised of thirty mathematics teachers of grade three; 15 from public and 15 from private sector were selected. For the need assessment, a questionnaire (three point rating scale) was formulated to understand the difficulties and problems faced by teachers during teaching and learning process of mathematics and to analyze the need of teaching mathematics through computer. The questionnaire was in both languages i.e. in English and Urdu.

Interactive CD

The interactive CD was prepared on the following concepts from mathematics textbook of grade three:

- Place Value
- Roman Numbers
- Even and Odd Numbers
- Fractions
- Addition

- Subtraction
- Multiplication
- Division
- Money

The content and activities of the CD were developed in the light of the data collected from math teachers. Teachers shared the difficulties, which they face during the math teaching in a conventional way. The content and activities of CD were developed in such a manner to facilitate both teachers and learners. Teaching through CD would help teacher to remove the boredom of the math class. The CD can be run on a Windows (Intel Pentium 800 MHz processor running Windows 95 or later). Once interactive CD is running, all navigation is conducted via mouse click making it user friendly. Different graphic softwares were used for the preparation of CD-I:

- Microsoft PowerPoint
- Photoshop
- GIF Animator
- Sound Forge
- Multimedia Builder

The difficulties and problems faced during Math teaching as indicated by teachers during study were: problems due to difference in mental and capacity levels of students; lack of attention at home; lack of parental interest; parents do not come to discuss their child's problem; teachers are not provided with any instructional material; students forget the previous concept while learning the new one; and students evidence difficulty in mastering the multiplication and division. Teachers were of the view that it is interesting and motivating for the children to be taught with the help of computers, and it would be better to start at early classes so they can get on it easily. But if the teachers themselves do not have computer skills then how could they be able to integrate technology into their teaching. The teachers also pointed out that training of teachers in the use of technology into their teaching should be the integral part of teacher education programs. All the teachers have a great desire to change the teaching and learning system and upgrade it.

In the current scenario of IT age, it is necessary to provide students the

education, which is more effective, and students can learn it in less time and retain it for longer duration. The new trends in compact disk can fulfill the purpose especially at the age of concept building of the student. Teaching, with the help of computers, helps the students to grasp the abstract concepts, visualize them and practice them. The interactive CD not only helps in teaching but also in independent and self-paced learning. The level of mastery in mathematics can only be achieved by drill and practice. The CD-I provides drill and practice in order to understand the concepts.

Conclusion

The current century is the century of science and technology where it is required that every child is given the best opportunity to study so that he / she can give his feedback to the nation. This is only possible when the youth is provided with cutting edge technology. And this is only possible when the instructional media is prepared in the country and cutting down its production cost.

The number of students in a class in our country is too large to efficiently handle by a single teacher. Here interactive material is useful to provide quick feedback to students at the moment. At the primary level, students require drill and practice of the same concept, to be inculcated each item has to be revised again and again, and require such revision the checking items again and again, and this can be done by the computer in a better manner.

Therefore, it is required to develop such instructional material, which could enhance the learning of the students. The subject of mathematics is usually treated as rough and hard subject and students as well as teacher consider it boring to teach and learn. The interactive material can make it fun and enjoyment to teach and learn.

Computer technology is becoming prevalent in the lives of many people; therefore, it must be integrated within Teacher education. Computer technology can help teachers expand their knowledge as well as enable them to participate in the world of technology. Technology should be integrated within teacher education in such a way that learners may be able to pursue best activities that are meaningful and relevant to their lives. So if we want to improve the situation, we have to provide full access to technology in the classes. Because without giving educators and students access to computer

technology, we cannot expect that they are going to utilize this in their teaching. And, in turn, they will not be able to prepare themselves and their students to face the future challenges.

Therefore, it is the high time for educational institutes to put such efforts, which can impart the students of the nation with quality and latest mode of education. In a country where subject specialist teachers are not available, providing such help is very effective in sustaining the minimum level of standard.

References

Anand, G.P and Ross, S.M.(1987). *Using computer-assisted instruction tp personalize arithmetic material for elementary school children*. Journal of Educational Psychology. 79/1

Capper, J and Copple, C.(1985). *Computer use in Educaion: Research review and instructional implications.* Wshington, DC. Cenetr for Research into practice.

Christman, E, et al. (1997). *Microcomputer-based computer-assisted instruction within differing subject areas: A statistical deduction.* Journal of educatiuonal computing Reearch, 16(3).

Fletcher-Flinn, C.M., & Gravatt, B.91995). the efficacy of computer assisted instruction(CAI): A meta-analysis. Journal of educational computing Research, 12(3).

Heinich, R, Molenda, Michael and Russell, J.D.(1993). *Instructional Media and the New Technologies of Instruction.*

Kinzie, M.B., et al (1992). Motivational and achievement effects of learner control over content review within CAI. *Journal of Educational Computing Research.* 8(10).

Kulik, J.A., et al.(1985). *Effectiveness of computer-based Education in Elementary schools*

Poole, B.J.(1998). *Education for an Information Age*. USA, McGraw-Hill companies.

Rasmussen, J.(2005) The Use of Computer Assisted Instruction in Preschool Education: Making Teaching Meaningful. *Early Childhood Education Journal* 33(2) 2005

Roblyer, M.D. et al (1997). *Integrating Educational technology into teaching*. USA, Prentice-Hall, Inc.

Sharp, V. (1999). *Computer Education for Teachers*. USA, McGraw-Hill companies.

Singh,C.P.(2006). *Introduction to Educational Technology*. Lotus press, Ansari Road, Darya Ganj, New dehli.

Thomas, R.M. and Kobayashi, V.N.(1989). *Educational Technology- its creation*,

Development and cross-cultural transfer. U.K., Wheaton and Co Ltd.

Wade, L.L. *Teaching Information literacy Skills using computer Assisted Instruction*.

http://chiron.valdosta.edu/are/Artmanscrpt/vol1no1/wade_am.pdf (retrieved on June, 2004)

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