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# Endorsement of Technology in Mathematics: Secondary Educational Perspective

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***Abstract :*** *This theoretical paper intends to explore the endorsement of technology in the teaching and learning of mathematics in secondary educational perspective. The secondary education scenario constitutes the most remarkable constituent in the educational life of each person. Mathematics is an exquisite factor which helps in the enhancement of learners intellectual proficiencies in intuitive thinking, logical reasoning, problem solving, spacial visualization and abstract thinking. Through this paper the investigator bring about the significance, recent trends and implications of using technology in the teaching and learning of mathematics. This paper will be beneficial for the learners and teachers in their mathematics educational endeavors.*

## I. Introduction

Mathematics is an inevitable part in the general education scenario. The abstract and hypothetical nature of Mathematics often causes disregard and lethargy among the learners. The teaching and learning of the discipline involves tedious efforts like memorizations, calculations, explorations, finding solutions, connecting different ideas etc. it has been always a big concern of teachers and educators in enhancing the competencies in mathematics. In the *Principles and Standards of School Mathematics* the National Council of Teachers of Mathematics (NCTM) identified the "Technology Principle" as one of six principles of high quality mathematics education (NCTM, 2000). This principle states: "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (p. 24).

The use of technology in education is in accordance with the key theme and objective of 21st century learning, i.e., student centered learning. Technology enhances self learning capabilities and creative faculties of the learners. The use of technology in mathematics has a long history starting from the use of abacus. Technology can change the nature of school mathematics by engaging students in more active mathematical practices such as experimenting, investigating and problem solving that bring depth to their learning and encourage them to ask questions rather than only looking for answers (Farrell, 1996; Makar & Confrey, 2006).

Olive and Makar (2010) argue that mathematical knowledge and mathematical practices are inextricably linked, and that this relation can be strengthened by making use of technologies. They developed an adaptation of Steinbring's (2005) 'didactic triangle' that in its original form represents the learning ecology as interactions between student, teacher and mathematical knowledge. Introducing technology into this system transforms the learning ecology so that the triangle becomes a tetrahedron, with the four vertices of student, teacher, task and technology creating 'a space within which new mathematical knowledge and practices may emerge' (p. 168). In this theoretical paper the investigator intends to explore the endorsement of technology in the teaching and learning of mathematics with reference to secondary education.

## II. Computer Assisted Instruction in Mathematics

For making the discipline, mathematics impressionable to the student's teacher should be well versed with different methodologies of teaching mathematics. Computer Assisted Instruction is one of the most effective auto instructional methods which can be incorporated in the teaching methodology of mathematics. Computers can provide ample opportunities for the students in meaningful learning of the subject since computers can act according to the imagination of the students. When compared to the traditional method of teaching mathematics, Computer Assisted Instruction can bring enormous changes in the teaching and learning environments. The investigators have pointed out the factors in the following tabular form.

| Conventional Method | Computer Assisted Instruction |
|---|---|
| Teacher centered | Student centered |
| Limited number of learning resources' | Diversified learning resources' |
| Time and place constraints | Able to learn at their own pace and place |
| Content may not be arranged in an interesting and meaning full way which can cause self learning | Meaningfully arranged content which creates a positive attitude towards the learning of mathematics |
| There are a lot of chances for rote memorization | Duration of active learning and distributed practice of academic content has influenced the level of academic retention (Belfiore, Skinner & Ferkins, 1995). |
| Chances for boredom and reluctant from learning | Remain motivated throughout the learning process |

## III. Employment of calculators and converters

The present learner needs a methodical excellence in mathematical knowledge for transforming into a technologically oriented workforce in this era. Technology, in particular computer and calculator technology, is seen as a means of providing the tools needed to facilitate the transition, while serving as a catalyst for further change in high school mathematics education (Owens & Waxman, 1995). Calculators and converters form an integral part of the teaching and learning process of the discipline. It is not only stressful but also a waste of time to memorize the formulas and for doing calculations. The usage of calculators and converters is not a substitute but it enhances the proficiency in computations. It also improves the involvement of students in their learning endeavors.

In primary classrooms the practice of using calculators and computers is not judicious, since learners should become well versed and enriched with numerals. After the attainment of conceptualization and fluency in dealing with numbers, it will be advantageous for the learners to use technology in constructing new knowledge. The investigator showcases the catalytic role of calculators and converters in the form of TIP using the Figure 1 presented below.

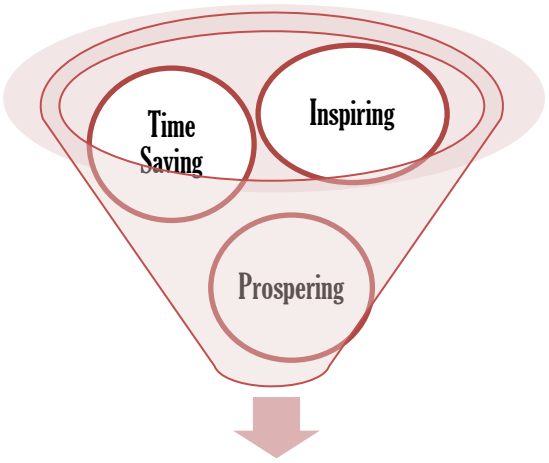


**Figure 1: Calculators & Converters as Catalyst in Math Learning**

## IV. Handheld Graphing Technology

Handheld Graphing Technology is one of the most recent innovations in the field of educational technology. It provides a variety of learning tools which helps the learners to visualize and develop a better perception in mathematics. The first Handheld Graphing Technology was introduced by Casio (1985) in Japan. In a large survey from Michigan State University (Burril, 2002), one of the central findings is the following:
*Given supporting conditions, the evidence indicates that handheld graphing technology can be an important factor in helping students develop a better understanding of mathematical concepts, score higher on performance measures, and raise the level of their problem solving skills"*(p. 1).
Laughbaum (2003) points out key features of graphing technologies like:

- Students can see mathematical concepts represented in multiple ways (e.g., graphs, tables, algebraic expressions, and geometric figures) and make connections between them.
- Students can collect, explore, and analyze data through the use of a data collection extension device.

The recent research advocates that Handheld Graphing Technology, in mathematics enhances the conceptual understanding, develops better attitude in learning and can also aid in the continuation of education in the field of mathematics.

## V. Interactive White Boards

Interactive White Board is another innovation in the field of Information and Communication Technology. In the words of Glover (2001), Interactive White Board is more than a computer, a projector or a screen – its sum is greater than its parts. It equips the teacher with numerous facilities to support the curriculum transactions and give enormous possibilities for the learners in the meaningful inculcation of the curriculum transaction. The multimedia presentations, multitude visualizations, animations, digital content and multi persons make Interactive White Board (IWB) more appealing in the mathematical classrooms. The resources' that are available through IWB are pictuarised in the Figure.2

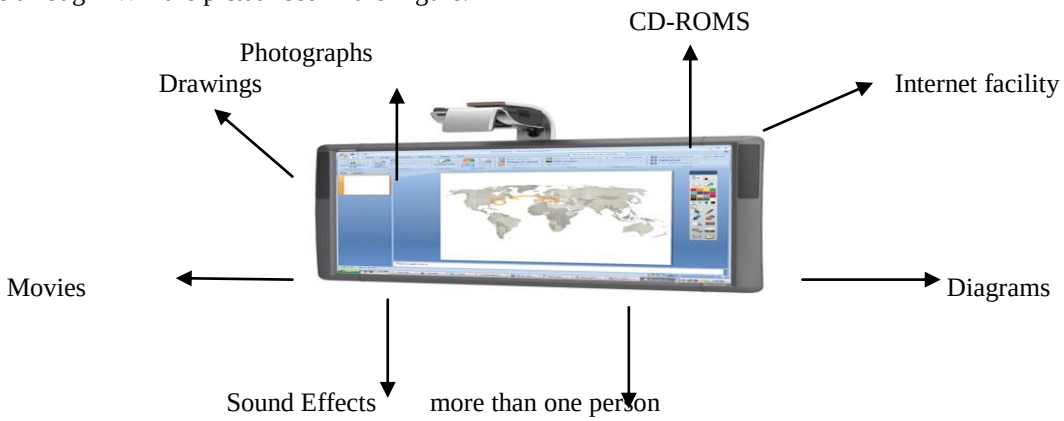


**Figure.2 Resources Interactive White Board (IWB)**

The high school students will be the major beneficiaries of using Interactive White Board (IWB) in mathematics class rooms.IWB provides novel facilities including multimedia representations and which can increase the students' engagement and retention. Another important advantage of using Interactive White Board in mathematics class room is that more than one person viz. teachers or students can involve actively at the same time. Through the resources mentioned in Figure.2 learners will be able to understand the abstract facts in a more meaningful way.

**Implications of the use of technology in math classrooms**

The investigator points out the implications of using technology in mathematics classrooms as the following:

- Clarity and meaningful learning
- Active involvement of students
- Visualization of abstract concepts
- Availability of variety of learning resources
- Accessibility of more experts
- Hands own experience

- Make learning enjoyable
- Provision of group learning
- Improves self learning skills
- Achievement of mastery learning

**Conclusion**

The advancement of a high tech workforce necessitates a solid foundation in mathematics in this century. Through this paper investigator presents a detailed description about the endorsement of technology in mathematics education. It was depicted that technology can enhance and encourage the students in learning mathematics. Also mathematics teachers with expertise in technology will be able to bring about the multitalents of the students in the field of mathematics. This paper will be beneficial for the learners and teachers in their mathematics educational endeavors.

**References**

[1]. Merrilyn Goos (2010) Teaching Mathematics? Make it count: What research tells us about effective teaching and learning of mathematics. research.acer.edu.au/cgi/viewcontent.cgi?article=1067&context

[2]. Olive, J., & Makar, K., with V. Hoyos, L. K. Kor, O. Kosheleva, & R. Straesser (2010). Mathematical knowledge and practices resulting from access to digital technologies. In C. Hoyles & J. Lagrange (Eds.), *Mathematics education and technology – Rethinking the terrain. The 17th ICMI Study* (pp. 133–177). New York: Springer.

[3]. Cheung, A., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review*, 9, 88-113. http://dx.doi.org/10.1016/j.edurev.2013.01.001

[4]. Laughbaum, E. (2003). Hand-held graphing technology in the developmental algebra curriculum. *Mathematics and Computer Education 37*(3): 301-314.

[5]. *Tomas Bergqvist et al.*, The role of technology when teaching mathematicshttp://www.mai.liu.se/SMDF/arkiv/MB9/MB9,%2025-33.pdf

[6]. Interactive Whiteboards in Mathematics Teaching: A Literature Review Mauro De Vita Education Research International Volume 2014 (2014), Article ID 401315, 16 pages http://dx.doi.org/10.1155/2014/401315