USE OF VIRTUAL TOOLS FOR TEACHING AND LEARNING MATHEMATICS

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Abstract

Mathematics is a subject of abstraction. It deals with concepts that require abstract thinking, visualization and spatial thinking skills. Mathematics requires traditional approach in teaching to a great extent but virtual means of transferring knowledge can make learning more meaningful. Concepts like that of geometry, transformations, relations etc can be dealt in an improved manner with virtual tools. Virtual environment creates a learning situation that is otherwise not possible for the teacher to create in the classroom. The simulations and transformation is not possible with limited tools of the classroom. Hence virtual environment is required to teach efficiently. In this research paper, research will explore various tools and technologies available to teach mathematics at school level. These virtual tools make it possible for the learners to visual the concept easily. Researcher has identified few tools, apps and technologies useful in teaching Mathematics effectively. A critical analysis of these web tools is also done by the researcher.

Keywords:

Introduction

Mathematics is branch of study that has topics such as numbers which is abstract in nature and requires deeper understanding of associations, it also has concepts of spaces, size and distance that is geometry that requires spatial thinking and visualization. This is a discipline that has concepts like trigonometry that students find difficult to relate with. Mathematics is the subject of structure, order, and relationship that arose from primitive activities of counting, measuring, and describing object forms. It is concerned with logical thinking and quantitative computation, and its evolution has included an increasing degree of idealisation and abstraction of its subject matter. Virtual world has great ability to deal with abstraction and visualization in a improved manner.

Virtual learning environment provides a platform to use digital tools to learn something. Virtual learning tools provides an opportunity to present a topic or concept

through web tools, resources and technologies. Virtual learning tools has a capacity to deal with abstractions efficiently. It takes the thinking in an artificial world of animations, simulations and gaming that is required to learn concepts of Mathematics and otherwise becomes difficult for the teachers to bring that real world in the classroom.

Web tools, simulations, animations can be used to teach mental rotations, transformations, functional relations and pattern identification in Mathematics. Modelling can be easily taught through these active web tools.

Objectives

The objective of the paper is to explore the latest digital tools available on the web to teach Mathematics effectively.

Latest web tools available to teach Mathematics

- **GeoGebra:** GeoGebra is an online tool to teach and learn mathematics. It is a free web tool to teach and learn mathematics effectively. It is a dynamic software to teach mathematics. It is a tool through which geometry, calculus can be easily taught. It has easy to use interface and active web pages. It provides opportunity to create active learning resource. Millions of users find it easy to teach through GeoGebra.
- **Wolfram MathWorld:** MathWorld is the web's most comprehensive mathematical resource, offered as a free service to the world's mathematics and internet communities by Wolfram Research as part of its commitment to education and educational outreach.MathWorld's technology is primarily based on Wolfram Mathematica. Mathematica is used to create the website itself, in addition to deriving, validating, and visualizing MathWorld's content. This achievement is made possible by its advanced mathematical typesetting and data-processing capabilities.Topics such as number theory, algebra, analysis, geometry, calculus, probability and statistics can be taught through this software.
- **Prodigy:**Prodigy promotes game based learning. This is an innovative way to learn maths in an interesting manner. Fun based learning is the basis of Prodigy Math for classes 1 to 8. They have aligned games with Indian curriculum. The user can select the standard and curriculum required. Games based learning provides scope of active learning and students can learn actively. Students can learn through experience and remain engaged in learning. Prodigy offers chance to practice skills.
- **Globaloria:** Playing games to learn math is an effective teaching strategy. Students can design games that test STEM concepts using Globaloria. Students can look at games that their fellow students have made in a gallery that is filled with them. Through games and social networking, this programme seeks to promote STEM

disciplines on a global scale.

- **Dragon box:**Dragon box is a learner-based math programme, 83% of kids can master the fundamentals of algebra in just one hour. Early children as young as five are exposed to algebra and the concepts of variables through engaging games and explanations. The images are vibrant and adorable, and students aren't even aware they are interacting with academic content.
- **Get The Math:** Get The Math is the tool which aims to connect algebra to everyday life. Students can discover how essential math is to daily life through lessons on "Math in Music" and "Math in Fashion." There are various ways for students to interact with algebra in the real world, including videos, activities, and other methods. Get The Math is a great tool for combining theory and practise.
- **Geometry pad:** A fun method to learn geometry and put key structures to the test is using Geometry Pad. It serves as your own tutor for learning geometry. Presenting their geometric creations, taking measurements, using a compass, and experimenting with numerous other geometric forms are all simple tasks that students can complete.This app, which is intended for use exclusively on iPads and tablets, is comparable to the math tool GeoGebra mentioned above.
- **Khan Academy -** With the Khan Academy app, students can learn arithmetic outside of the classroom at your own speed using practise tasks, instructional videos, and a personalised learning dashboard. In addition to mathematics, they also provide science, computer programming, history of (art), economics, and other subjects. They want to deliver a free, top-notch education to everyone, wherever, so all of the stuff they offer is available for free. The non-profit Khan Academy collaborates with a network of sponsors and volunteers.
- **Desmos -** For students in grades 6 through 12, Desmos provides a free online graphing calculator in addition to digital activities. The main product is a calculator with features comparable to several TI calculators costing Rs.7964.13 or more. It's a well-liked choice for individuals who want to use technology to successfully teach math. The digital activity centre, another Desmos product, offers a number of interactive classes that students can do on their own tablet or computer.

  Teachers can build lessons in a section and share them with other teachers.

The digital tools of learning Mathematics brings innovation and creativity in learning and teaching. The above-mentioned digital tools givegreater chance to practice and learn

with flexibility. The control of learning is in the hands of the learner. Mathematics lessons require web tools to be utilized in every sense to bring clarity of the concepts.

Benefits of using digital tools in Mathematics

- **Learner controlled learning:** Learner has complete control over learning. Some digital tools allow learner to set the pace of difficulty. Learners can learn at their own speed and convenience. These tools and software allow the user to practice and repeat as many times as the user wants.
- **Prediction ability:** Mathematics develops the prediction ability of the students. In business and marketing field, it is important to predict what is going to happen at the end if particular path is selected. Mathematics has the ability to develop the prediction ability of the students. The digital games and tools helps in developing such ability without having the fear of wastage.
- **Modelling:** Through mathematical modelling, we try to give abstract description of concrete things. With software like Mathematica, Modelling can be done easily as it is difficult to bring actual models with original size in the class. For example, Mathworks is a very useful website that provides effective tool to develop mathematical models such as MATLAB and Simulink.
- **Active participation:** Learners actively participate in learning with these digital games and apps. They take interest in learning and are not passive while learning. Active analysis of each step takes place and they get immediate feedback of their action.
- **Complete focus and attention:**The students have to pay complete attention and are focused while learning. The learning environment is so dynamic and fast sometimes, the attention doesn't divert. The students are focused while learning and practicing the concepts.
- **Real world analysis:** Digital tools takes the learning closer to real world objects. The learner could relate the procedural aspects of learning mathematics to existing world forms. The analytical power increases with real demonstrations through web tools.
- **Resourceful teaching:** The teachers should not feel the non-availability of the effective resources. ICT has made the teachers resourceful in all aspects. Abstract Mathematical concepts can be dealt effectively through technology.

Traditional approach to teaching and learning facilitates more the Procedural Mathematics. Procedural mathematics can be learnt in the presence of teacher as it requires the step wise analysis of the solution, error correction and clarification at every

step. But when it comes to conceptual mathematics, teachers need special resources such animation techniques, simulations, web tools and graphic tools to develop insight into the concept.

Virtual tools create an innovative learning environment for the learners and facilitate the mathematics learning efficiently.They provide space for exploration, discovery and practice without fear of failure.

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