

A Study on Graph with Desmos through ICT in Diploma in Elementary Education of Tamil Nadu State Board

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Abstract: *This paper aims to integrate ICT tool DESMOS to teach the Graph chapter in Diploma in Elementary Education of Tamil Nadu state board. This approach enables to bring out skill based learning outcomes pertaining to psychomotor domain. It explains the teaching and learning strategies, i.e. visualization of graphical structure with the above module. The optimal use of various exercises on graph chapter based on ICT tool 'Desmos' ensures attaining the learning outcomes. Desmos also gives hands-on experience to understand the mathematical, Graphical concepts. It attempts for an extended study on Algebra, Some special Graphs (i.e.) $xy = k$, and Geometry in Diploma in Elementary Education of Tamil Nadu State Board.*

Keywords: ICT Education, Desmos, Quadratic equations, Graphs

1. Introduction

In the pre-technology education context, the teacher is the sender or the source, the educational material is the information or message, and the student is the receiver of the information. In terms of the delivery medium, the educator can deliver the message via the “chalk-and-talk” method and overhead projector (OHP) transparencies. This directed instruction model has its foundations entrenched in the behavioral learning perspective (Skinner, 1938) and it is a popular technique, which has been used for decades as an educational strategy in all institutions of learning. Also traditionally, Mathematics was taught as its own discipline without emphasis on social, political or global issues. There may be some emphasis on practical applications in science and technology. Information and Communication Technologies (ICTs) play an increasingly important role in the way we communicate learn and live. The challenge is to effectively exploit these technologies in a way that serves the interests of learners and the larger teaching/learning community.

UNESCO considers that ICTs can contribute to universal access to education; equity in education, the delivery of quality learning and teaching, teachers' professional development as well as to improve education management, governance and administration provided with the right mix of policies, technologies and capacities are in place.

UNESCO takes a comprehensive approach to ICTs in education. It is through the Organization's Intersect oral Platform that it focuses on the joint work of the Communication and Information, Education and Science Sectors where the issues of access, inclusion, equity and quality in education can be addressed with Digital technologies are everywhere in media, government, commerce and education. In 21st century, the present Educators need to be knowledgeable and critical users and creators of digital technologies. This introduces you to a range of digital technologies currently in use in education,

discusses critically the ways such technologies can enhance learning, and examines in detail the limitations of Information and Communication Technologies (ICT). It focuses on the role of the digital world for children and emphasizes the critical knowledge and skills necessary for safe, responsible and moral use of ICTs in learning and teaching. The unit also supports student to select and use digital technologies to improve their own learning and assessment.

2. Need For The Study

The importance of visualization in mathematics, graphs are powerful because they allow students to visualize mathematical concepts (Battista & Clements, 1991). From this view point, graphs are similar to other representation such as pictures, images, and diagram. However, graphs are even more powerful because they can also provide students with visual representation of mathematical relations, functions, and their properties. According to Leinhardt, Zaslavsky, and Stein (1990), the introduction of graph represents an important landmark in the middle school mathematics curriculum. Using graph to represent functions constitutes “one of the earliest point in mathematics at which a student uses one symbolic system to expand and understand another (e.g., algebraic functions and their graphs, data pattern and their graphs, etc.

Most prior studies on graphs have focused on the difficulties students encounter when interpreting and/or producing function graphs (see review by Leinhardt et al., 1990). For example, students tend to understand time/distance graphs as descriptions of the shape of the territory walked (Kerslake, 1981) and focus on isolated points instead of focusing on intervals, the shape of the graph, and the functional relationship between two variables (Bell & Janvier, 1981). Additionally, students often fail to relate the shape of the graph of a function to its symbolic-algebraic representation. Such difficulties might be moderately due to student's limited experience with function graphs, which tend to be

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introduced rather late in the curriculum (commonly no earlier than in 6th grade) and dissociated from the teaching of algebra as rules for solving equations (Yerushalmy & Schwartz, 1993)

Teaching about graphs should go beyond how to plot points and be integrated with other mathematical contents. Alternative approaches to the teaching and learning of algebra (e.g. Schwartz & Yerushalmy, 1992; Yerushalmy & Schwartz, 1993) call for a functions approach to algebra, where, instead of starting by learning how to compute solutions to equations using the syntactic rules of algebra, students start by learning about function graphs. Equations are then conceived as comparisons between two functions. Switching from a traditional approach to a functions approach to algebra requires the preparation of teachers, as well as evaluating how this preparation may influence their classroom practice. In our review of the literature, we have found very few studies on how mathematics teachers use graphs to teach mathematics and no studies on how ICT impacts the way teachers use graphs in class, which is the focus of the present paper.

3. Objectives of the Study

The objectives of the study are to how to introduce ICT in Diploma in Elementary Education of Tamil Nadu State Board.

- To integrate the different ways of teaching in Diploma in Elementary Education of Tamil Nadu State Board using the Dynamic online software Desmos.
- To assess the improvement in mathematical psychomotor skills among Diploma in Elementary Education of Tamil Nadu State Board.
- To identify the nature of curve and finding the solution in the quadratic equation.
- To strengthen the mathematical concept of “Quadratic Graph” by showing suitable example in Diploma in Elementary Education of Tamil Nadu State Board.

4. ICT and its Significance

The ICT Test Bed evaluation (Underwood 2006) provides evidence that many teachers use ICT to support innovative pedagogy. It states: “New technologies that provide a good fit with existing practices, such as interactive whiteboards are first to be well-established, but others like video conferencing, digital video and virtual classroom environments are now being integrated, providing evidence of ongoing learning by the workforce. Training needs to be continued to support pioneering pedagogy.”

ICT is a standard term referring to technologies, which are being used for collecting, storing, editing and passing on information in various forms. Information and Communication Technologies (ICT's) are one of the major fashionable factors shaping the global economy and producing the rapid changes in the society. ICT have fundamentally changed the way of learning, communicating, and business. ICT can renovate the nature of education, where and how learning takes place and the roles of students and teachers in the teaching learning process.

ICT have the potential to develop access, quality and effectiveness in education in general and to enable the development of more and better teachers in particular. A personal computer is the best known example of the use of the ICT in education, but the term multimedia is also consistently used. Multimedia can be interpreted as a combination of data carriers, for example video, CD-ROM, Floppy disc and internet and software in which the possibility for an interactive approach is followed.

“Changes that takes full advantages of ICT will only happen slowly over time, and only if teachers continue to experiment with new approaches.” ICT Resource will enhance the existing topic through some aspects of the lesson and tasks. For example, to teach the topic “GRAPH” Using the smart board the teacher presents the skill of drawing graphs in order to promote the topic in visualization sense will create interest in teaching and learning process. With the help of online tool like via Desmos the task of presentation is reduced and the role of student's participation is increased to understand the concepts. The only thing is that the teacher should be well trained to use the ICT tools Desmos.

5. Desmos – Activity Builder

How this Works?

A Desmos class activity is basically a sequence of screens, each with different task, prompt, or question. With Activity Builder, you decide on what goes on each of these screens to build your own lesson from scratch.

There are three screen types: graph, question and text. You may use as many as you like, in any order you like. You can drag to rearrange the screens, and edit your activity as many times as you need. When it's ready, click “Create Class Code” to get a dashboard and class code for your class. Copy and paste the link to share it with other teachers. Your Activity Builder is available on your teachers. Desmos.com browser activities page.

In particular, there's a certain education startup out there, relentlessly seeking to hijack our internet browsers and mobile devices into a — should we say — graphing variety. And it comes with a funky name as well: Desmos. All grades math functions like sin, cos, tan, asin, acos, atan are supported free signup: <https://www.Desmos.com>, facebook: <http://www.facebook.com/Desmos.org>. It emphasis the students to explore in Start Graphing. Graph functions, plot data, evaluate equations, explore transformations, and much more.

6. Harmonizing Approach

While using the ICT resource online software Desmos to motivate the pupils learning and it will reduce the burden of taking notes inside the classroom. Here this online software program teaches the graphical concept in a lively learning environment in order to create interest in mathematical concepts. All the approaches can enhance attainment skills, but the effect may be different. It will automatically develop the psychomotor skills in teaching and learning process. It

encourages students to formulate their own explanation and new learning experiences.

7. Impact of ICT on Student Performance in Diploma In Elementary Education

There is no standard definition for student performance. The standard approach focuses on achievement and curricula, how students understand the courses and obtain their degrees or their marks. However, a more wide-ranging definition deals with competencies, skills and attitudes learned through the education experience. The narrow definition allows the observation of the outcomes of any change in higher education, while the more extensive definition needs a more complex strategy of observation and a focus on the labor market. The outcomes of education are mainly validated in the labor market. The relationship between the use of ICT and student performance in higher education is not clear, and there are contradictory results in the literature. Earlier economic research has failed to provide a clear compromise concerning the effect on students' achievement.

In the Diploma in Elementary Education of Tamil Nadu State Board. In the second year Teaching of Mathematics book the topic as "Quadratic Equation" Teaching the above topic using the dynamic online software Desmos the remarkable performance of the teacher is obtained by practicing the module frequently.

8. Scrutiny During Intrusion

Desmos is open source online software in teaching and learning process. In the modern day mathematical concepts it plays a vital role in student's participation inside the classroom. It can be used to teach the 3D shapes, analytic geometry and calculus etc. This software is used in different platforms through online. It also gives hands on experiences to the student inside the class room and develops the learning environment .It stimulate the psychomotor skills in mathematical concepts. In this study the most important topic is Quadratic Graph from Diploma in Elementary Education of Tamil Nadu State Board was taken in to consideration .Many abstract concepts have been clearly explained through concrete examples and diagrams. In particular construction of Quadratic Graph , Finding solutions of two quadratic equation and the nature of curve through graphs .In addition to that solving special graph i.e. $xy=k$ and finding solution and the nature of the curve with the help of this free online software Desmos.

9. Visualizing the Concepts

To draw a Quadratic Graphs with the quadratic equation $y=ax^2+bx+c$. one has to open the online software Desmos by using the url:www.Desmos.com ,then we have to type the linear equation in the command bar with the format $y=ax^2+bx+c$. On completion of the above command when we click the play button by order of the command the required picture is drawn by the online software .The complete picture is in the form of video format and that should be easily understood by the learner. In these circumstances the learner will see the variation of parabolic

curve in the graph and finding the solution for both quadratic equation .In addition to that the learner learns how to draw a Rectangular hyperbolic graph, elliptical graph etc. It is important to mention that the method of drawing graph in the graph sheet is static and the learner learns the concepts in abstract, but when we teach this concept through the online software Desmos it is easy to understand the graphical concept very easily. In all the figures we can interpret all the values in order to get various graphical structures pertaining to, Quadratic Graph, Special Graph i.e. $xy=k$ etc .Similarly all the above figures can be drawn and shown in the following illustrative examples:

10. Construction of Quadratic Graph in the for $y=ax^2+bx+c$ and Identifying the Nature of its Roots

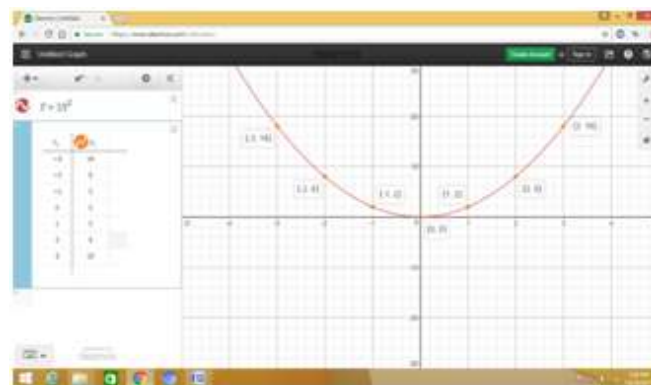


Figure 1

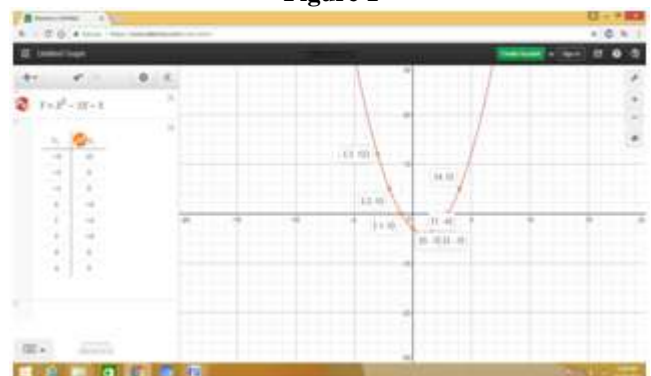


Figure 2

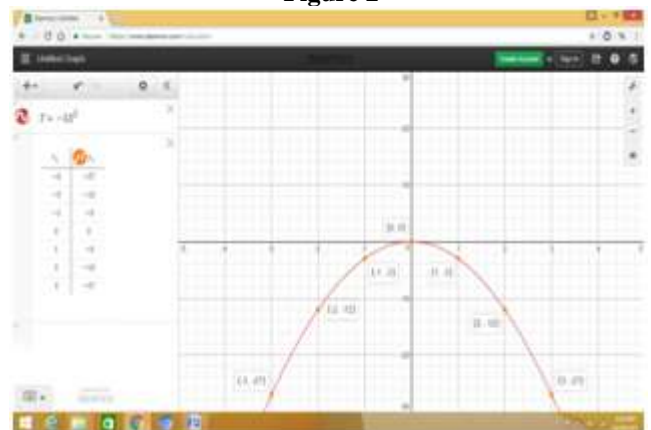


Figure 3

11. Findings

On observation of all the annexed illustrations we can tabulate the required solution in the following tab

Table 1

S No	Polynomial ($y=ax^2+bx+c$)	Vertex	Sign of a	Nature of Curve
1	$y = 2x^2$ $a=2, b=0, c=0$	(0,0)	Positive	<ul style="list-style-type: none"> • Open upward • Lies above and on the line $y=0$ • Symmetric about $x=0$.i.e.,y-axis
2	$y = -3x^2$ $a = -3, b = 0, c = 0$	(0,0)	Negative	<ul style="list-style-type: none"> • Open downward • Lies below and on the line $y=0$ • Symmetric about $x=0$.i.e.,y-axis
3	$y = x^2-2x-3$ $a = 1, b = -2, c = -3$	(1,-4)	Positive	<ul style="list-style-type: none"> • Open upward • Lies above and on the line $y=-4$ • Symmetric about $x=1$

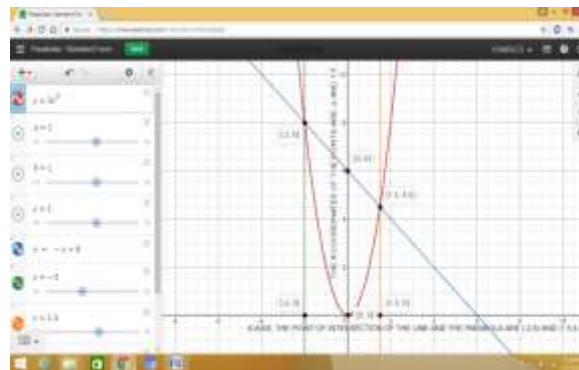


Figure (iii)

The point of intersection of the line $y = -x + 6$ and the parabola $y = 2x^2$ are shown in the above graph where the x -coordinates of the points are -2 and 1.5 and it is clearly visualized by using the software Desmos.

12. Discussion Along with Implications

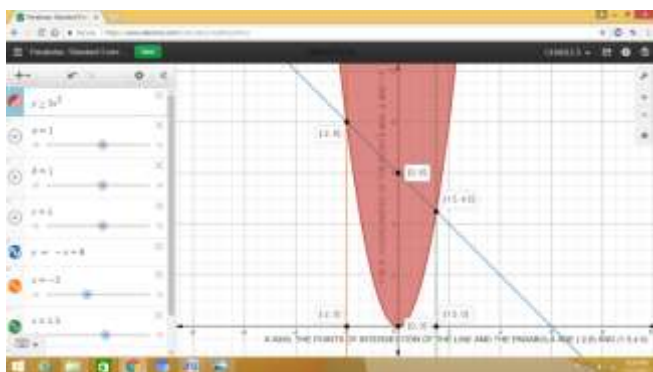


Figure (i)



Figure (ii)

The point of intersection of the line $y = m x + c$ and the parabola (i) $y \geq ax^2$ & (ii) $y \leq ax^2$ are shown in the above graphs where the solution set are in the shaded region and it is clearly visualized by using the software Desmos.

A teaching method comprises the principles and methods used by teachers to enable students learning. These strategies are determined partly on subject matter to be taught and partly by the nature of the learner. These qualities are helpful to refine individuality. Motivating and appreciating is a success which comes in a different shapes and sizes, therefore the teacher as a good scholar must identify the required ICT tools to give the method of teaching in the fruitful manner. In this case the dynamic software Desmos was adequate to teach the curriculum and was appreciated by the students with poor background in rural areas.

13. Conclusion

The use of ICT tools gives significant relief in satisfying the students understanding in the concept. In this context teachers have to take up the challenges to create a new dimension in teaching mathematics in the topic “Quadratic Equation – Finding solution and the Nature of the Curve” ,so that the objectives of the psychomotor skills of the students is attained. Hence the teacher has to master over the subject taught by utilizing this kind of online software available in the market and he should always think about to improve the teaching technique by learning the new technology. A similar study was made to teach the concept of algebra, special graphs i.e., $xy = k$ and co-ordinate geometry in the Diploma in Elementary Education of Tamil Nadu State Board.

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