



# A STUDY ON GRAPH THROUGH AN ICT TOOL GEOGEBRA FOR THE COURSE SECOND YEAR DIPLOMA IN ELEMENTARY EDUCATION OF TAMIL NADU STATE BOARD

Mr.P.Charles Paul<sup>1</sup> ,Mr.G.Thulasi<sup>2</sup> , Mr.J.Manikandan<sup>3</sup>

<sup>1</sup> Lecturer in Mathematics, District Institute of Education and Training, Lawspet, puducherry

<sup>2</sup> Lecturer in Mathematics, Department of School Education, Government of, Puducherry

<sup>3</sup>Student, District Institute of Education and Training, Lawspet, puducherry

## ABSTRACT

*This paper employs multitude of teaching learning process to facilitate the skill based learning outcomes specific to psychomotor domain through ICT. The present study provides guided practice with the GeoGebra software tools to teach the Linear Graph chapter in Diploma in Elementary Education (D.El.Ed) of Second year in Tamil Nadu State. It explains how GeoGebra can be effectively used to accomplish specific objectives i.e. visualization of graphical structure with the above module. GeoGebra gives not only a hands-on experience to understand the mathematical, Graphical concepts but also to develop the skill instantly within specified period of time and helps to track the skill on Graphical knowledge. It also aims for an extended study on Algebra, Statistics and Geometry in the second year source book prescribed for the (D.El.Ed) Course of Tamil Nadu State Board.*

**Keywords:** ICT Education, GeoGebra, Graphs.

## I. 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 embedded 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. In tradition 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.



According to UNESCO (2002) “ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters”. Teachers are at the core of any living society. Technologies play an important role in training programme of teachers. Students access knowledge and information through TV, digital media, cable network, internet and social media I. e. Face book, Twitter, Whatsapp, Linkedinn, Igo, Line, and Wechat etc. ICT is very important for Preservice teacher education programme in the 21st Century. Without proper knowledge of ICT teacher cannot perform in his/her class room and it could not be said to be a complete one.

## II .NEED AND IMPOTANCE OF 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 interpret time/distance graphs as descriptions of the shape of the terrain 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 partially due to students’ limited experience with function graphs, which tend to be 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.

### **III. OBJECTIVES OF THE STUDY:**

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

- ❖ To integrate the different ways of teaching in Diploma in Elementary Education Second Year of Tamil Nadu State Board using the Dynamic online software GeoGebra
- ❖ To assess the improvement in mathematical psychomotor skills among Diploma in Elementary Education students
- ❖ To strengthen the mathematical concept of “Linear Graph” by showing suitable example in Diploma in Elementary Education of the Tamil Nadu State Board.

### **IV. WHY DO WE USE ICT IN TEACHER EDUCATION?**

The classroom is now changing its look from the traditional one i.e. from one way to two way communications. Now teachers as well as students participate in classroom discussion. Now Education is based on child centric education. So the teacher should prepare to cope up with different technology for using them in the classroom for making teaching learning interested. For effective implementation of certain student centric methodologies such as project-based learning which puts the students in the role of active researches and technology becomes the appropriate tool. ICT has enabled better and swifter communication; presentation of ideas more effective and relevant way. It is an effective tool for information acquiring-thus students are encouraged to look for information from multiple sources and they are now more informed then before. So for this reason ICT is very much necessary for Teacher Education.

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 embedded, but others like video conferencing, digital video and virtual classroom environments are now being incorporated, providing evidence of ongoing learning by the workforce. Training needs to be continued to support innovative pedagogy.” 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 viz. GeoGebra 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 GeoGebra.

### **V. ABOUT GEOGEBRA ...**

GeoGebra is dynamic mathematics software for all levels of education that brings together Geometry, Algebra, and Spread sheets, Graphing, Statistics and Calculus in one easy-to-use package. GeoGebra is a rapidly expanding community of millions of users located in just about every country .GeoGebra has become the

leading provider of dynamic mathematics software, supporting science, technology engineering and mathematics (STEM) education and innovation in teaching and learning worldwide

## **VI. COMPLEMENTARY APPROACH**

While using the ICT resource online software GeoGebra 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.

## **VII. RECENT TRENDS IN TEACHER EDUCATION**

Based on various changing needs of our society now emphasis is also given to the various educational theory and educational practices. According to these theories and practices changes are also undergo in teacher education also. It is natural that teacher education must include new technology. Teachers should also know the right attitudes and values, besides being proficient in skills related to teaching. As we know the minimum requirement of any training programme is that it should help the trainee to acquire the basic skills and competencies of a good teacher. Now-a-days new trends in teacher education are Inter-disciplinary Approach, Correspondence courses, orientation courses etc. Simulated Teaching, Micro Teaching, Programmed Instruction, Team Teaching are also used in teacher education. Now-a-day Action Research also implemented in Teacher Education. ICT acts as the gateway to the world of information and helps teachers to be updated. It creates awareness of innovative trends in instructional methodologies, evaluation mechanism etc. for professional development.

In the second year in diploma in elementary education course of duration two years of Tamil Nadu state, teaching of mathematics books contains the ten units, of which the topic is linear graph teaching the above topic using the dynamic online software GeoGebra the tremendous performance of the teacher trainer is achieved by practicing the module frequently.

## **VIII. OBSERVATION MADE DURING INTERVENTION**

GeoGebra 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 Linear Graph from the second year of Diploma in Elementary Education course of two years duration in the 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 Linear Graph, Finding solutions of two linear equation through graph .In addition to that solving quadratic equation and finding solution with the help of this free online software GeoGebra.

### IX. MATHEMATICAL VISUALIZATION CONCEPT AND ANALYSIS

To draw a Linear Graph with the linear equation  $y = mx + c$ . one has to open the online software GeoGebra by using the url:www.Geogebra.com ,then we have to type the linear equation in the command bar with the format  $y=mx + c$ . 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. Similarly we can draw various types of graph having different slope i.e.  $m$  and different  $y$ -coordinates. In this circumstances the learner will see the variation of line in the graph and concludes that the line having different slopes ,the direction of the line changes .In addition to that the learner learns how to draw quadratic graphs, parabolic 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 GeoGebra 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 Linear Graph, Quadratic Graph, Parabolic Graph etc .Similarly all the above figures can be drawn and shown in the following illustrative examples:

### X. CONSTRUCTION OF LINEAR GRAPH IN THE FORM $y = mx + c$ HAVING DIFFERENT SLOPES AND Y-INTERCEPTS AND FINDING SOLUTION FOR IT.

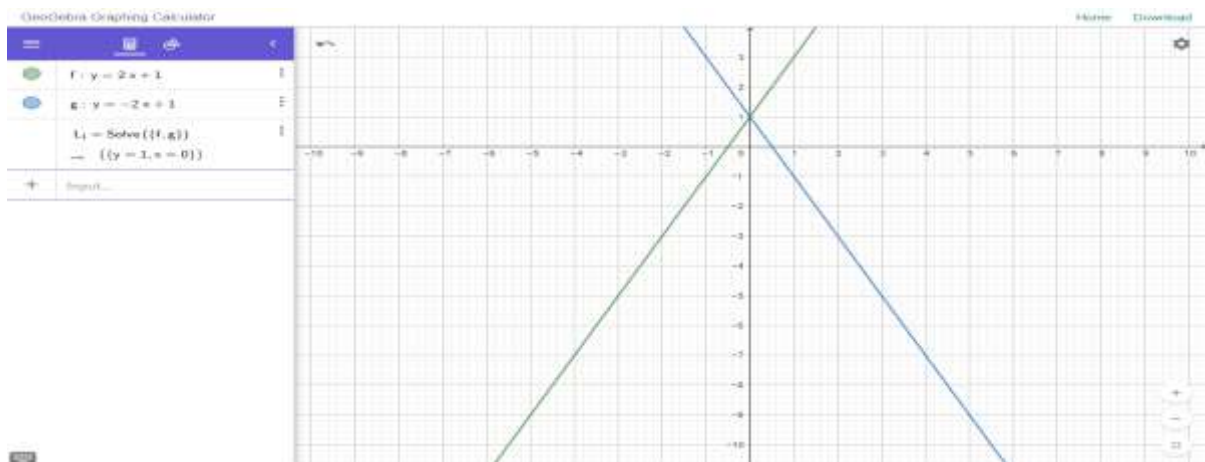


Figure (i)

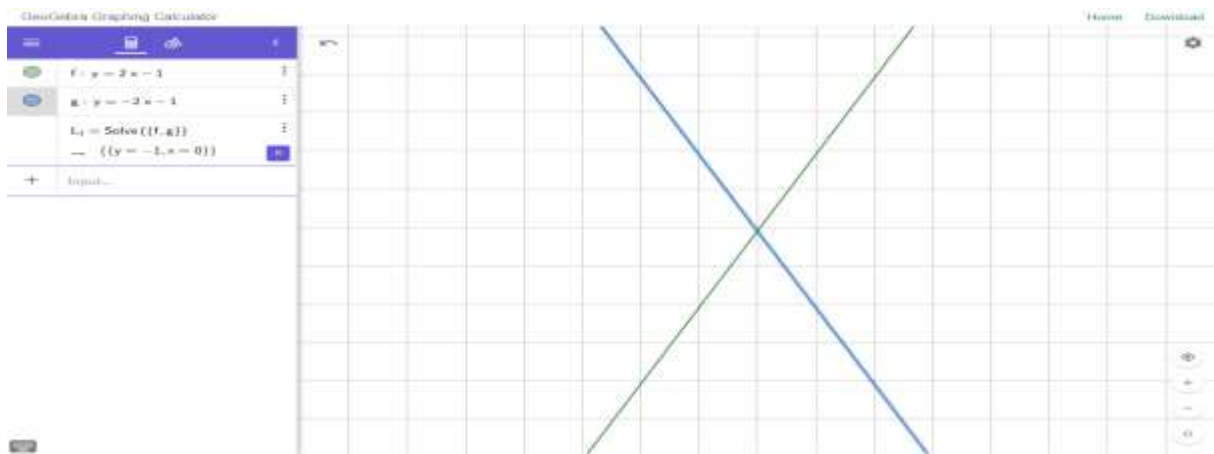


Figure (ii)

**SPECIAL CASE:**

- (i) In the two linear equation , if the slope of the equation are equal then the lines are parallel
- (ii) In the two linear equation, if the product of the is equal to -1 then the lines are perpendicular.

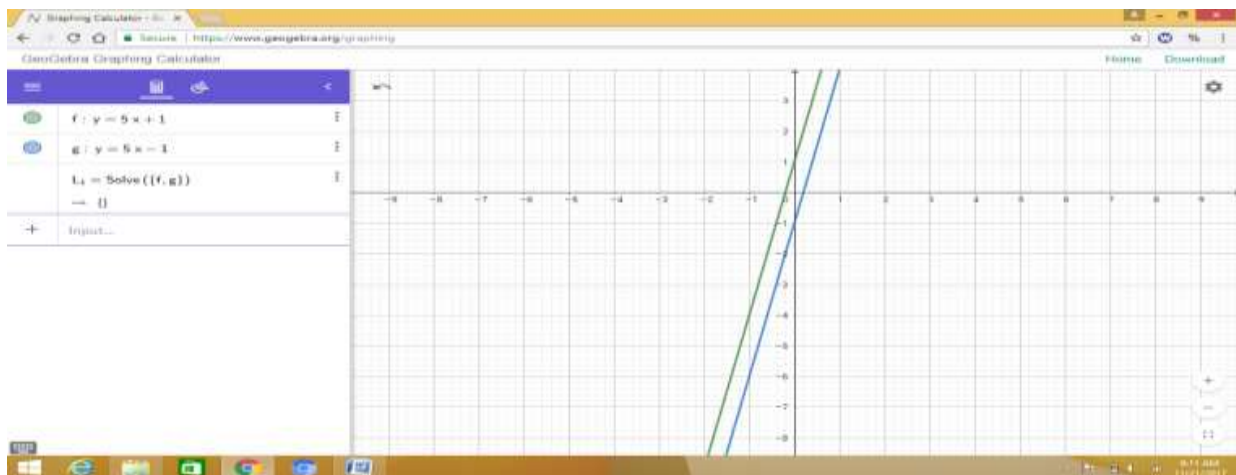


Figure (iii)



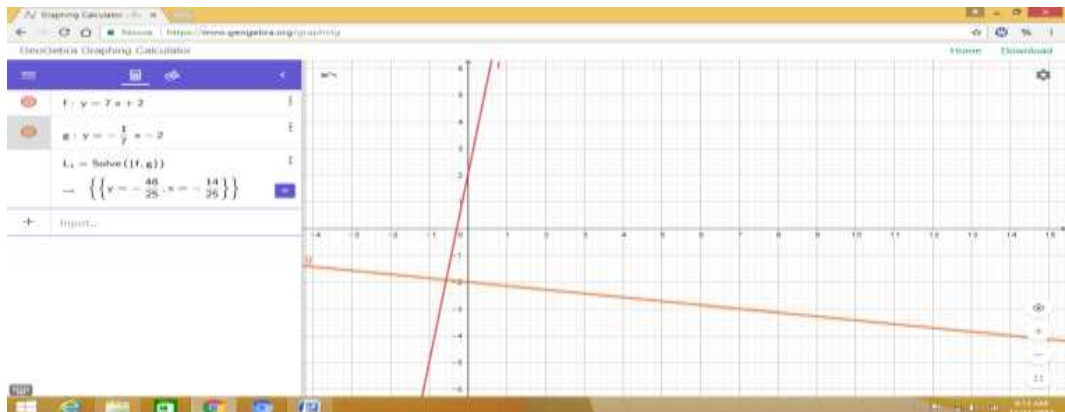


Figure (iv)

**XI. FINDINGS**

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

**TABLE: 1**

SLNO	EQUATION OF LINEAR GRAPH $y=mx+c$	SLOPE	y-INTERCEPT	SOLUTION BETWEEN TWO LINEAR EQUATION
1	$y=2x+1$	$m=2$	$C=1$	The intersecting point is (0,1)  SOLUTION:(0,1)
2	$Y=-2x+1$	$m=-2$	$C=1$	
3	$Y=2x-1$	$m=2$	$C=-1$	The intersecting point is (0,-1)  SOLUTION:(0,-1)
4	$Y=-2x-1$	$m=-2$	$C=-1$	

**TABLE: 2 (SPECIAL CASE)**

SLNO	EQUATION OF LINEAR GRAPH $y=mx+c$	SLOPE	y-INTERCEPT	NATURE OF TWO LINEAR EQUATION
1	$y=5x+1$	$m=5$	$C=1$	Here the slope $m_1 = m_2$  THE LINE ARE PARALLEL
2	$Y=5x-1$	$m=5$	$C=-1$	
3	$Y=7x+2$	$m=7$	$C=2$	Here the slope $m_1 \times m_2 = -1$  THE LINE ARE PERPENDICULAR
4	$Y=-1/7x-2$	$m=-1/7$	$C=-2$	



## XII. DISCUSSION ALONG WITH IMPLICATIONS

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 GeoGebra was adequate to teach the curriculum and was appreciated by the students with poor background in rural areas.

## XIII. CONCLUSION

In this findings and study the teacher should come with the different techniques and technology and the teacher should be the broad and open minded for the students but at the same time he has to motivate and create interest among the students in teaching and learning process. Mathematics being an abstract subject, 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 “Linear Equation – Finding Solutions ” ,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 , In order to develop the personality development of the student in the teaching learning process. It is also suggested that the similar study may be carried on the concepts of algebra and co-ordinate geometry in the second year Diploma in Elementary Education course of Tamil Nadu State Board.

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