A PILOT STUDY OF THE USE OF GEOGEBRA AS AN ICT TOOL IN TEACHING PRIMARY SCHOOL MATHEMATICS

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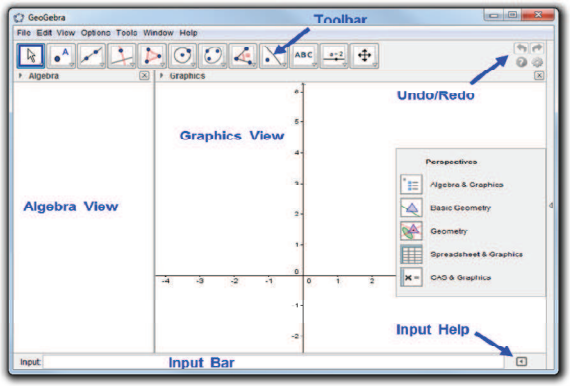
Abstract: Geo Gebra is worldwide emerging software which is used by Mathematicians as an open source. It serves as a bridge to a link Geometry and Algebra. To explore the process of Teaching and Learning of primary Mathematics and its implication of the software in classroom practice is the vital concept of this paper. This frame work is set out to show the potential of Geogebra to learn and teach of primary Mathematics in the class was taken as a case study. This study was conducted in Panchayat union primary school, Pullalur, Kanchipuram District, India. Around 15 pupils were involved in the project and utilized several data collection, techniques to ensure the triangulation of Data, to explore different perceptions. This data consisted of classroom observations, teacher interviews and student Question arises. This paper focus on the constructivist learning group.

Keywords: Experimental study, Primary school Mathematics, Mathematics pedagogy, Information of communication Technology, Geogebra software.

Introduction: In Modern teaching method various external sources are used to simplify learning Mathematics. GeoGebra is one among them. It is a Mathematical software introduced by Markus Hohen warter. Two learning styles exist in our society

- Traditional learning---"Teacher centered" (The teacher was the major Role)
- Constructive learning---'Student Centered' (Student have higher importance)

The use of ICT makes the students more confident and can make teaching more effective and interesting. GeoGebra is interactive Mathematics software. It is an open source software for mathematics and is considered as a Boon as it can be easily downloaded worldwide and used for the free educational practice of Primary mathematics in class rooms.



Screenshot of a GeoGebra window

Development during 2001 - 2006

- 2001: Created by Markus Hohenwarter
- Mar 2002: Master's thesis in Computer Science & Mathematics Education
- Nov 2002: European Academic Software Award
- Mai 2005: User Forum & GeoGebraWiki
- Feb 2006: PhD project in Mathematics Education funded by Austrian Academy of Sciences

Research questions: This work outlines the progress of Research in Mathematical ideas and concepts based on technical teaching. The vital role of the program was to analyze the role of Geogebra as a pedagogical tool in the Primary level of teaching and learning of Mathematics in Panchayat Union School, Pullalur, Kanchipuram District, India .The Significant Questions were:

- What is the importance of GeoGebra in teaching and learning practice of mathematics?
- Does GeoGebra support learning practice of mathematics?
- How GeoGebra is used in primary classrooms?
- How classrooms are improved by the implementation of GeoGebra?
- What are the students' learning attitudes while using Geogebra?

Participants and procedures:

- The Research was done in a rural area of Kanchipuram District in a Primary school. There are around 15 students - 10 boys and 5 girls - around the age of 8-10 years in the class. At first the students were informed by the teacher about the case study and research work and they were provided with the three Mathematics lessons based on computers.

The research at various stages:

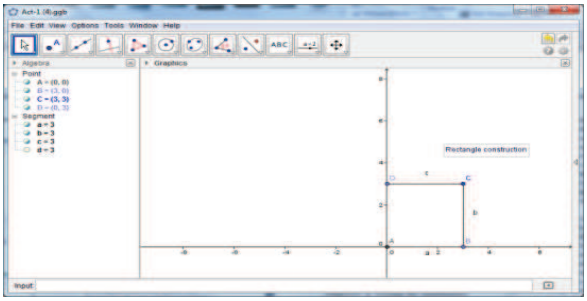
- The First step was to find a Primary School teacher who was willing to co-operate in the research.
- The Next step was to get the proper permission from Headmaster of the school. The following step was to choose a topic for their study and to determine any three reasons and developing the sequences of activities, considering the suggested

activities among the students.

- The aim of the procedure was similar with the aims set by curriculum for a particular lesson. The teacher thought the lessons based on the computer and the case study was done inside the classroom. Hence an interactive team work evolved without the prior experience of using Geogebra software. The system of the class activities and the worksheets were developed in co-ordination with the teacher. The design of Geogebra would not affect the normal work of the teaching and learning as the teacher never had the experience to do so.
- During the process the author was only a participant observer. The author helped the teacher in managing the classroom management regarding working on computers and general class room situation.
- The lessons were conducted in a special suite of ICT inside the room there was enough facilities other work resources like papers,books,and Mathematics equipments to the students to use the systems in a proper structural frame work
- They were provided with apt information about the usage of keyboard and the mouse. Necessary information about tools was provided through projector.
- All the students were enthusiastically involved in colobractive learning and team were working in pairs in computer was not coming under the limitation of ICT Resources.

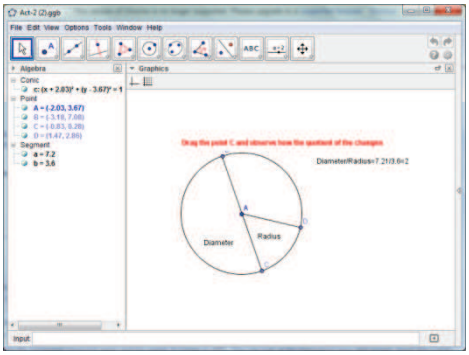
Activity: 1 (**Rectangle Construction**)

The first lesson involved some basic definitions about the Rectangle and the exploration of the relation between the length and breadth. , The teacher and I chose to do it empirically by students' exploration in Geogebra since we wanted students to interact with the software. However, after this initial experimental approach, the teacher and the students also proved it deductively during the classroom discussion.



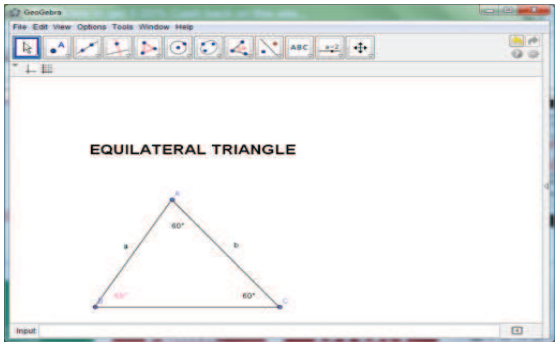
Activity: 1 (**Rectangle Construction**)

The Second lesson involved some of the vital definitions of an equilateral triangle and its properties. All the sides of an equilateral are equal and measure 60^{o}. Hence an equilateral triangle consists of all the three sides and its angles equal.



Activity-3: (**Construction of a Circle**)

The third lesson constituted the basic definitions of a circle and the relation between radius and diameter. The teacher and the author selected to apply GeoGebra software empirically, as it was desired to



Activity: 2 (**Equilateral Triangle Construction**)

have the students to get accustomed with software. After this experimental approach both the teacher and the students did it deductively as well with an effective impact.

- The co-operative and individualized learning included three parts. The foremost is the introduction program for 10 minutes and the second one is the work of each individual around 20-25 minutes and the review of the whole class with the teacher for 5-10 minutes.
- During the process all the students were asked to sit in center of the room at round desks, while participating in discussion and in practical session, they were allowed to navigate and to explore co-operatively in pairs.
- During the Research, the author maintained a general regard to daily schedules, lesson plans and self reflection on each lesson. All the major sources of data were recorded and all the students were provided with Questionnaires. The field notes and the author's record were the supplementary sources.

Interviews: The aim of an interview was to see the teacher perspective about the lesson and it was property achieved and utilized by the teachers and students. An important thing to note was that as the teacher observed a significant moment during the lesson session.

Questionnaires: After completion of three lessons the Questions were given to the students. It included a brief introduction followed by three open ended questions.

"For the past three days all to us used computers in learning the mathematics lesson especially using Geogebra software. Please give a brief answer to the following question:

- ❖ The important lesson which you like most is?
- ❖ Which lesson you find it so difficult among the three?
- ❖ Do you find any difficulties in using Geogebra?

Findings: The data collected through observation and interview was analyzed. All these activities of learning process provide a strength support for each student to achieve an easy understanding the concept which taught.

- ❖ Students need to spend more time in performing the task rather than the teacher teaching that concept.
- ❖ Constructing figures were found to be very easy after a day in Geogebra rather than using scale and pencil.
- ❖ Students were able to interpret the changes that happen to all the centers. When the type of triangle was changed which was in the conventional method?
- ❖ Students were willing to work in GPS rather than individually. Though two students to start individually, after some hits they joined together to work. The reason reported was that they feel bored while working alone. They also added that they could share their ideas while working together. The negative aspect of working together was that they get disturbed when others interfere in their ideas. But the final output was excellent when they worked together.
- ❖ Even if the teacher was not present, students never wanted for any others instruction. They were committed to their work. They came running to the class and started doing their work themselves.

Conclusion: All these showed that students think and work by themselves in a constructivist environment and Geogebra was an ideal tool in providing that environment. The aim of this study was to investigate the potential and implementation of Geogebra for teaching primary mathematics. Constructivism in a well accepted approach for meaningful learning ICT can play a vital role in providing the experience affectively that the constructivist approach provides to the students. Geogebra aimed to encourage learners to continually question and in so doing become the learners become lifelong learners. Thus Geogebra supports constructivist approach of learning mathematics.

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