Impact of GeoGebra on Student Learning and Inclusion of GeoGebra in the Mainstream

B. Vennila
Sri Eshwar College of Engineering, India

K. Renuga
Avinashilingam Institute for Home Science and Higher Education for Women, India

J. Ebenesar Anna Bagyam
Karpagam Academy of Higher Education, India

EXECUTIVE SUMMARY

This chapter investigates the use of ICT in education. In particular, the usage of GeoGebra as the geometrical instruction aids in the visualization of concepts, and this chapter aids in inspiring students and instructors throughout the teaching and learning process. The primary purpose of this work is to determine the effective use of GeoGebra in teaching calculus and statistical concepts among economics students whose performance is less satisfactory in math. These can be achieved by the aforementioned goals, i.e., by identifying the pupils whose performance is poor. They could be divided into two groups: research group who learns calculus and statistical concepts using GeoGebra and conventional group who learns the same concepts by traditional way of teaching. This chapter demonstrates that ICT-based learning yields superior results than conventional teaching methodology.

DOI: 10.4018/978-1-6684-7583-6.ch011

INTRODUCTION

Information and Communication Technology (ICT) holds vast potential for educators and learners to enhance educational experience. With its increasing integration worldwide, especially in developing nations, ICT is making waves in the realm of teaching and learning. A notable testament to this is the "Technology Usage and Integration" objective of India's National Education Policy (NEP) 2020, which aims to pave the way for India to become a prominent knowledge economy and a digitally empowered society. Through ICT, even rural inhabitants are now gaining access to quality education.

A common challenge among students is the perceived complexity of economic mathematical principles. While there are several software options like Stata, R, and SPSS to aid in understanding, GeoGebra, a Free Open-Source Software (FOSS), stands out for appropriate grade-level application. It uses visual representations to make economic data playful for the learning student, in how graphing can interact with one another. The software was originally developed for educational purposes as GeoGebra has its roots at the University of Salzburg in Austria, where Markus Hohenwarter created it as part of his master's thesis in 2001. The software combines geometry, algebra, spreadsheets, statistics, and calculus, making it a comprehensive tool for all educational levels and a boon for both students and teachers.

In the realm of economics, GeoGebra supports using the tool by allowing students to interact with various graphical representations. Numerous academic studies have affirmed its positive impact on students' mathematical understanding at the middle and high school grade-level (Samura et al., 2021; Yimer, 2022; Zulnaidi et al., 2020). While works have explored its content relevance to basic and higher education in mathematics, few have delved into its efficacy in illustrating the application to economics educators. This study seeks to evaluate GeoGebra's effectiveness in teaching economics-based concepts to students. It assesses students' learning progression when introduced to economic concepts through GeoGebra. The findings, while drawing comparisons with previous studies, offer unique insights given the distinct experimental conditions and subject focus. Moreover, a survey exploring the integration of GeoGebra into the curriculum has been conducted among educators, further emphasizing its growing importance in economic education.

GEOGEBRA TOOL

GeoGebra software offers six different views of mathematical objects. Three of these views are new to GeoGebra: the Graphics View, the Algebra View, and the Construction Protocol.