

USING SOFTWARE SUCH AS GEOGEBRA IN MATHEMATICS EDUCATION

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Abstract:

This article discusses the effective use of modern pedagogical and information technologies to increase the efficiency of mathematics lessons by organizing the educational process based on advanced foreign educational technologies. One of such tools is the GeoGebra software, which helps organize algebra and geometry lessons more effectively. The use of GeoGebra contributes to enhancing students' interest, imagination, and understanding of mathematical concepts, as well as developing their creative and analytical thinking skills.

Keywords: GeoGebra, mathematics, ability, creativity, motivation, learning.

INTRODUCTION

In recent years, the landscape of mathematics education has seen significant transformation due to the integration of innovative technological tools. Among these tools, GeoGebra has emerged as a leading platform that enhances both teaching and learning experiences. This dynamic mathematics software combines geometry, algebra, spreadsheets, graphing, statistics, and calculus in one easy-to-use package. Here, we explore the benefits and applications of GeoGebra in mathematics education, illustrating how it fosters a deeper understanding of mathematical concepts.

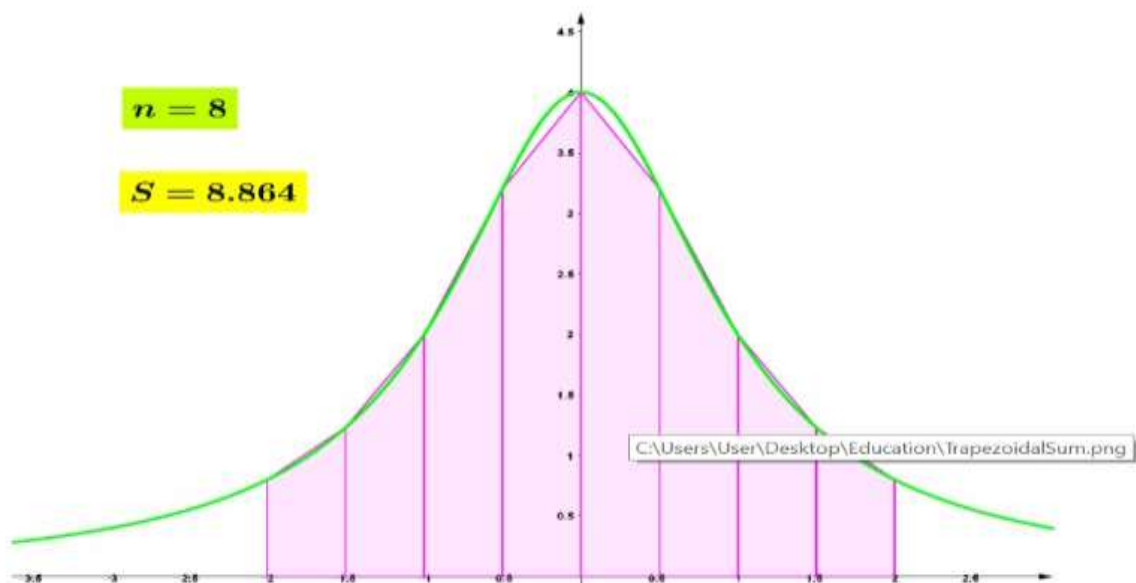
LITERARY ANALYSIS:

GeoGebra application has become a part of the curriculum in secondary schools in many countries. The benefits of using GeoGebra, according to Dikovitch [1], are its user-friendly interface, ability to encourage students in project and discovery learning, ability to help students to enjoy ownership of their own creation, ability to encourage collaborative learning, ability to help in visualization of abstract nature of mathematics and ability to engage students in the active construction of knowledge by manipulating variables in GeoGebra [2]. Moreover,

GeoGebra has been used to teach mathematics as a pedagogical tool [3]. Some of the studies in Uzbekistan have evaluated the impact of GeoGebra in teaching and learning [4] and indicated that school-level students demonstrated a better understanding of the abstract mathematical concepts while using GeoGebra.

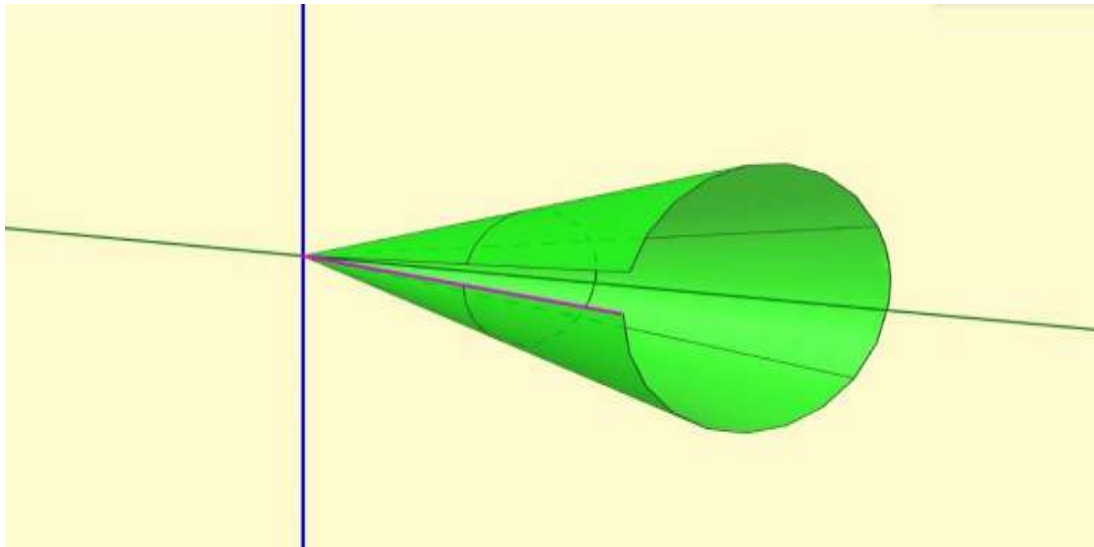
METHODOLOGY OF RESEARCH.

We knew a famous method of research known as the “teaching experiment” [5]. Although the teaching research cycle helped us to design, implement, assessment or analysis and refine our plan [6]. Likewise, GeoGebra helps teachers motivate students in learning mathematics at schools. Those learning are essential for in the curriculum or out of the curriculum. The role of GeoGebra software is predominant for students of different backgrounds. The students who have less motivation can be attracted towards learning mathematics. With integrating GeoGebra in mathematics classes helps develop logical thoughts and imagination. It is likely to be claimed that GeoGebra is a powerful visualizing tool that

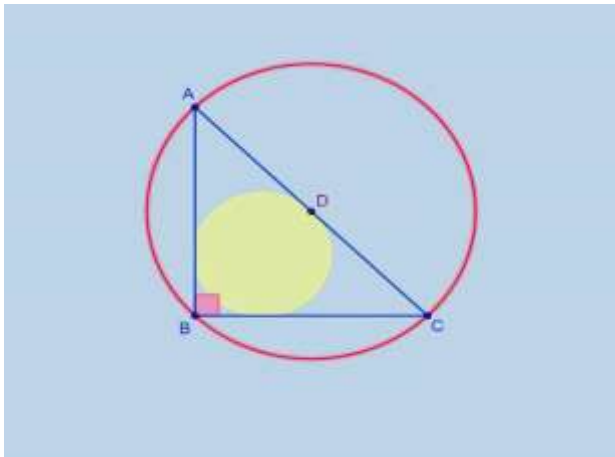


provides students with various experiences demonstrating the essential abilities to select when and how to use it in teaching-learning in math (1,2,3-figures).

1-figure. Cone.



2-figure. Trepozoidal Sum



3-figure. Circles inside and inscribed arc and central angle.

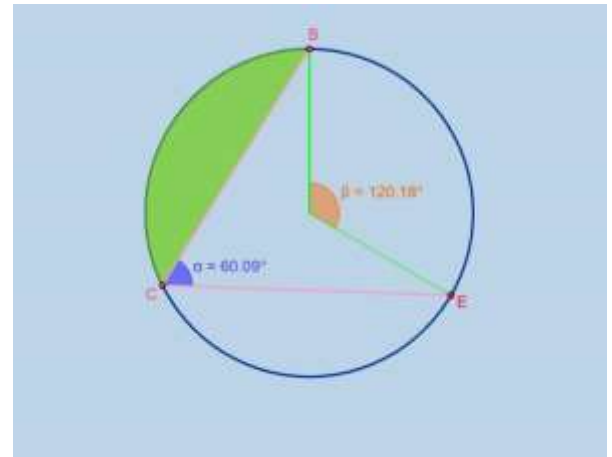
in the triangle

According to experiment classes, we can suppose that GeoGebra plays an important role in visualizing the concepts namely, semicircle, chord, central angle, arc, sector, and intersection points as of the motivating ICT tool to name and among other verifications and proofs (4-figure).

ANALYSIS AND RESULTS.

❖ Enhancing Visualization and Conceptual Understanding

One of the primary advantages of GeoGebra is its ability to create dynamic visualizations. Traditional teaching methods often rely on static images and figures, which can limit students' ability to fully grasp complex concepts. GeoGebra allows educators to construct interactive models that students can manipulate in real-time. For example, in studying



4-figure. Chord,

geometric transformations, students can observe the effects of translations, rotations, and reflections on shapes by directly interacting with them on the screen. This immediate feedback loop helps solidify understanding and makes abstract concepts more concrete.

❖ Integrating Multiple Representations

Mathematics often involves moving between different representations of concepts—such as graphical, numerical, and algebraic forms. GeoGebra seamlessly integrates these representations, allowing students to see the connections between them. For instance, when exploring quadratic functions, students can simultaneously view the algebraic expression, its corresponding graph, and a table of values. This multi-representational approach enhances comprehension and helps students see the interconnectedness of mathematical ideas.

❖ Enhancing Teacher Effectiveness

For educators, GeoGebra is a powerful tool that can enhance teaching effectiveness. It provides a vast array of resources, including pre-made activities, tutorials, and a community of educators sharing best practices. Teachers can easily create custom applets and simulations tailored to their curriculum, saving time and increasing instructional quality. Additionally, GeoGebra's intuitive interface means that teachers can focus on pedagogy rather than struggling with complex software.

CONCLUSION AND RECOMMENDATIONS:

The integration of innovative methods in mathematics education, exemplified by the use of GeoGebra, represents a significant advancement in how mathematical concepts are taught and understood. GeoGebra's ability to enhance visualization, support active learning, and integrate multiple representations makes it an invaluable resource for both teachers and students. As technology continues to evolve, tools like GeoGebra will play an increasingly important role in creating engaging, effective, and inclusive mathematics education environments. By embracing these innovations, educators can better prepare students for the challenges of the future, fostering a deeper and more meaningful understanding of mathematics.

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