



METHOD OF IMPROVING STUDENTS' MATHEMATICAL LITERACY WITH THE HELP OF ICT IN PRIMARY 2ND GRADE MATHEMATICS CLASSES (AS AN EXAMPLE OF SPATIAL FORMS)

Jumanova Sarvinoz Abduvali kizi

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Abstract:

The purpose of this article is to discuss how GeoGebra can be used to teach the concept of angle in Geometry in 2nd grade elementary level. This result is obtained after 2 weeks of lesson exploration. Teachers used GeoGebra as a teaching tool to make the lesson more creative and innovative in order to show how geometrical shapes relate with different angles in different polygons.

Keywords: math, pupil, method, GeoGebra, shape, space

INTRODUCTION

Today, technology is becoming an important tool in everyday life. Many educational researchers have carried out studies on integrating technology into education in order to increase the quality of teaching and learning [1]. Digital technology use in the mathematics classroom deals with two main facets of mathematics education: teaching and learning [2]. Several studies have investigated how students use technology or how teachers integrate technology into their teaching strategies.

MATERIALS AND METHODS

GeoGebra is an interactive geometry software offering students and teachers ways to design teaching modules and enable mathematics learning in a meaningful way. GeoGebra is another innovative tool for integrating technology in teaching and learning mathematics [9]. A powerful teaching tool like GeoGebra supports constructions with points, vectors, segments, polygon, straight lines and all conic sections. Besides that, it also can motivate students to explore mathematics and offer opportunities for critical thinking, which is central to constructivism.

GeoGebra can be used in many ways in mathematics teaching and learning [9]. It offers the following advantages:

- Provides basic features of Computer Algebra System (CAS) to bridge gaps between geometry, algebra and calculus.
- For demonstration and visualization as it can provide different representations
- As a construction tool as it has the abilities for constructing shapes
- For investigating to discover mathematics and help to create a suitable atmosphere for learning mathematics
- For preparing the teaching materials as a cooperation, communication and representation tool.

RESULTS AND DISCUSSION

Using GeoGebra, students can learn geometry more effectively such as [9]:

- Use the polygon and circle tools to draw shapes.
- Measure angles and distance
- Use GeoGebra sliders to adjust values of different problems.

Insert images into the file to demonstrate mathematical problem solving.

Example 1: Exploring Angles of Triangles. In this activity, pupils will explore the measure of angles in a triangle to prove that the sum of three angles in a triangle always add up to 180 degrees. Pupils can use the toolbar of GeoGebra to construct a visualization of triangle. (see Fig. 1)

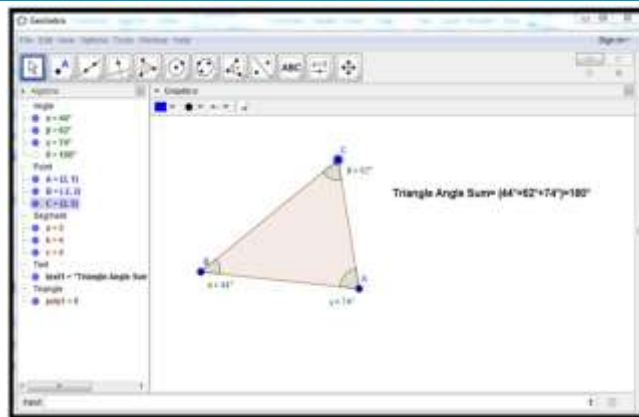


Figure 1 Triangle Sum Angle using GeoGebra.

Open a New GeoGebra File Construction process:

Step 1: Select to hide the axes from graphics.

Step 2: Select Polygon tool and click any three points to construct a triangle.

Step 3: Hide the label of each segment with right click.

Step 4: Select the Angle tool and click on each angle to show its value, for example, $\triangle ABC$, $\triangle BCA$, and $\triangle CAB$.

Step 5: To round off the angle, select Options, choose Rounding and click on "0 Decimal Places". All the values show without any decimal places.

Example 2: Exploring Acute, Obtuse, Right and Straight Angles

An angle is made up of two intersecting lines. The four types of angles such as acute, obtuse, right and straight angles are strongly emphasized in the primary mathematics curriculum. With the use of GeoGebra, angle can be constructed and moved with the slider. It helps pupils to see how an angle behaves and that each different angle has its own properties. An acute angle is an angle whose measure is less than 90° , an obtuse is an angle whose measure is greater than 90° but less than 180° . Furthermore, right angle is measured at exactly 90° and straight angle is measured exactly 180° and it is represented as a straight line. (see Fig. 2)

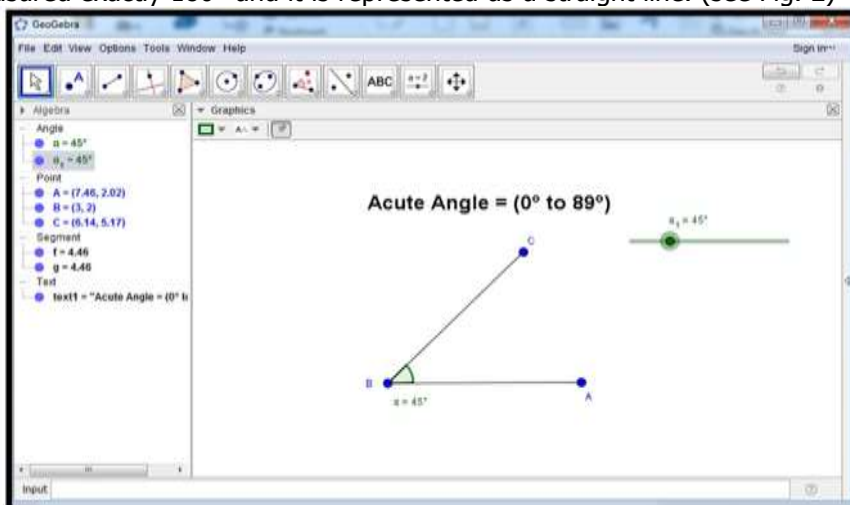


Figure 2 Acute Angle with Slider

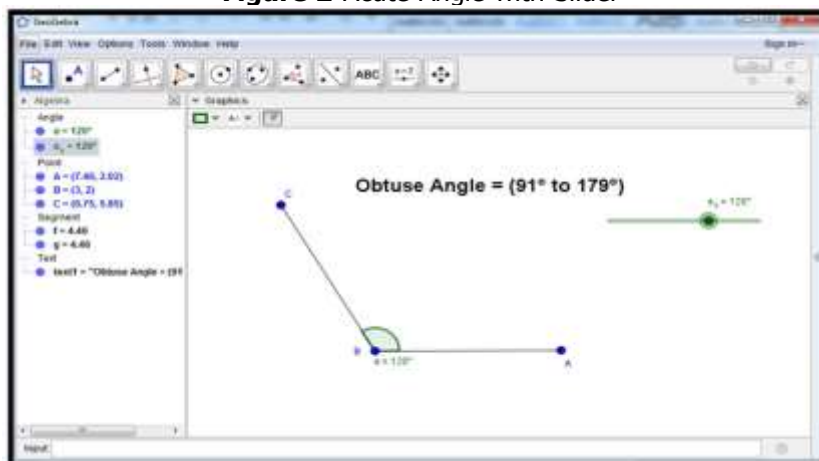


Figure 3 Obtuse Angle with Slider

Example 3: Exploring Interior Angles of Regular Polygon

A polygon is a two dimensional shape with straight sides. A regular polygon is defined as one having all sides equal and all angles equal. The interior angles of any polygon always add up to a constant value and it depends only on the number of sides. To prove that sum of interior angles in any polygon always add up to a constant value, GeoGebra allows pupils to construct and use the tool to measure the interior angle and see how the interior angles are formed and make a clear generalization from the construction. Here are some simple steps to construct the regular polygon and how an interior angle is measured:

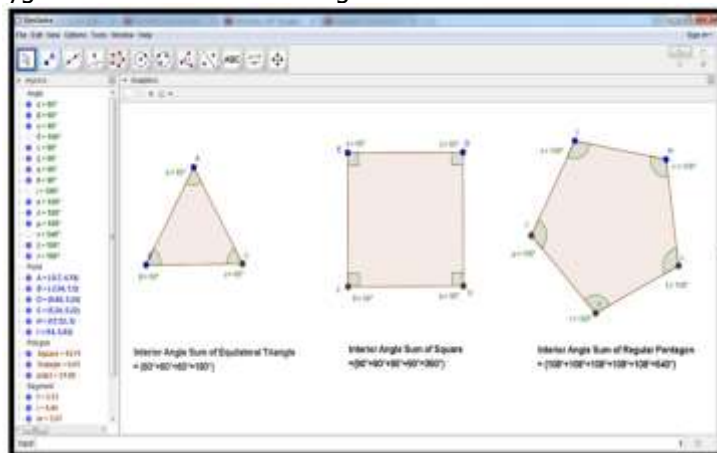


Figure 4 The Interior Angles Sum of Regular Polygon Open a New GeoGebra File

Construction process:

Step 1: Select to hide the axes from graphics.

Step 2: Select the Regular Polygon from the toolbar.

Step 3: Click any two point on the screen. It comes out with a command. Type the number of vertices into the command. If we want to construct a regular pentagon (which has 5 vertices), we type 5 into the command.

Step 4: The shape is formed. We rename the shape by right click.

CONCLUSION

Most of the pupils gave comment after they survey about they felt 2 weeks were not enough for them. They wished to have more time allocated to use GeoGebra to construct and develop further knowledge about the topic they learned. However, pupils were told that they could visit the GeoGebra website as this software can be downloaded for free. Therefore, students could use it at home to do their own exploration and also can share their works on the website. Through these instructional activities, researchers found out that pupils now liked the GeoGebra to learn mathematics and they had more understanding on the concept of angle. Furthermore, the use of GeoGebra helps pupils to think higher, explain about how to do and know why they need to do to arrive at the mathematical solution. Based on the survey, pupils showed positive feedback about using the GeoGebra to learn the concept of angle in Geometry.

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