

Applying 5E Teaching Model in Recognizing Regular Polygons and Rotations With the Help of Geogebra Software

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ABSTRACT

The 5E teaching model is a teaching model that gives students positive motivation. The 5E teaching model was proposed by Rodger W. Bybee and colleagues while working in the educational organization "Research on the curriculum framework for biology" in Colorado, the USA in 1987. The model is built based on the constructivist theory of learning, knowledge is formed through the experience and practice of learners. 5E stands for 5 words: Engagement - Exploration - Explanation - Elaboration - Evaluation, representing the five steps of the 5E teaching process. Our study aims to apply the 5E teaching model in regular polygon recognition and rotation with the help of GeoGebra software. With the theoretical research method and the experimental method for 102 students, including 52 students in the experimental class and 50 students in the control class, the study has shown that students who learn according to the 5E teaching model have better results than students who do not study this model. In addition, the research results also show that the 5E teaching model with the support of GeoGebra software in teaching regular polygon and rotation recognition has many advantages, developing learners' capacity and quality. Learners show much more interest and excitement than traditional teaching. Students develop their self-study and self-discovery abilities. The findings from the research results applying the 5E model are of great significance to teaching today.

Keywords: 5E cycle, GeoGebra software, rotation, Perspective, Model.

INTRODUCTION

The 5E teaching model was proposed by Rodger W. Bybee and colleagues while working in the educational organization "Research on the curriculum framework for biology" in Colorado, the USA in 1987. The model is built based on the constructivist theory of learning, knowledge is formed through the experience and practice of learners. The 5E teaching model is also the successor and development from the previous educational models of Herbart (1901), John Dewey (1930), Heiss et al (1950), and AtKin & Karplus (1962). In 2006, Bybee and colleagues launched the study "The BSCS 5E Instructional Model: Origins and Effectiveness". The work

further clarifies the process, specific instructions on teaching under the 5E model and evaluates the effectiveness of this teaching model in schools (Atkins & Karplus, 1962; Bybee et al., 2006). In the study "Effect of 5E Learning Model on Academic Achievement, Attitude and Science Process Skills: Meta-analysis Study" (2017), author Nevin Kozcu Cakir confirmed that the 5E teaching model is effective up to students' academic achievement, attitudes, and skills in doing science tests compared with traditional methods. One of the originators of the 5E teaching model is Rodger W. Bybee. According to Bybee, this teaching model aims to increase students' practical ability and he believes that the basic foundation of the 5E teaching model is based on constructivism. The research results are methodically and meticulously tested in some primary schools in Turkey (Cakir, 2017).

In Vietnam, there are also many studies on the 5E teaching model. In the article "Applying 5E model in teaching science through exploring lesson plan design" (2016) by Vu Thi Minh Nguyet, she affirmed that planning is an important part of teaching. If there is a well-planned plan, it will give us an effective lesson. Applying the 5E model of the discovery teaching method is a way to clearly plan the activities of teachers and students to help science lessons achieve high efficiency. The author has designed a science lesson plan with the topic of matter through the lesson: "The effect of heat on matter" and experimented in a junior high school. The results show that students are interested in carrying out experimental activities, working in groups, and collecting information (Nguyet, 2016).

Through the above observations, we find that the 5E teaching model has great effects in teaching, especially in discovery activities. This teaching model helps students experience and create knowledge for themselves (Giang, 2016). Therefore, students will remember for a long time and clearly understand the nature of the problem being learned. In this article, we focus on answering the following four questions:

1. What is the view of teaching according to the 5E cycle?
2. Advantages and limitations of teaching according to the 5E cycle?
3. Teaching process according to the 5E cycle with the support of GeoGebra software.
4. An illustrative example of applying the 5E model in recognizing regular polygons and rotations with the help of GeoGebra software.

LITERATURE REVIEW

Perspectives on the 5E teaching model

Currently, the 5E teaching model is applied by many countries and proved to be effective in practice. The 5E teaching model was researched and released by Rodger W. Bybee and colleagues in 1987.

According to Rodger W. Bybee et al. (2006), the 5E teaching model includes the following stages: Engagement, Exploration, Explanation, Elaboration, Evaluation (Bybee et al., 2006; Bybee, 2009). Each stage has an important function that contributes to effective teaching and helps students form better understandings of science and technology knowledge, attitudes, and skills. The stages of the 5E model are applied at many levels in the design of materials and curricula. The 5E model can be used in a one-lesson sequence (Bybee, 2014; Bybee, 2015).

Murat Tezer (2017) states that the model is called 5E because each stage begins with the letter "E" corresponding to Engagement, Exploration, Explanation, Elaboration, Evaluation. At the

beginning of the lesson, teachers begin with fun warm-up activities that encourage students to come up with ideas and ask a variety of questions. At this stage of student-centered discovery, students have the opportunity to rearrange what they have found by making and developing hypotheses. In the next stage, students will explain the problems given by the teacher. Next, in the elaboration stage, students apply the knowledge to specific exercises. The final stage is the evaluation phase. Teachers will assess student outcomes and encourage students to self-assess their understanding and ability after the lesson (Murat Tezer, 2017).

Nevin Kozcu Cakir (2017) said that: according to the 5E learning model, teachers, by identifying the students' previous knowledge, will pose research questions related to concepts or events to be learned. Students first establish their own experiences and information by answering research questions through teacher guidance. In the next stage, students starting from the previous knowledge base will receive new knowledge. Since concepts in the field of science are often abstract concepts, they are often difficult to construct. Therefore, students often make mistakes in constructing scientific knowledge. The 5E teaching model will help eliminate those mistakes because it allows learners to avoid mistakes through direct real-life experiences (Cakir, 2017).

According to Devangna Anilbhai Patel (2019), the 5E teaching model is a constructivist model in which the stages are systematically organized to bring about practical experiences leading to knowledge building, combining practical activities, oriented discussion, and problem-solving. In this model, learning occurs not by passive reception of transmitted information but by active interaction with objects and ideas (Patel, 2019).

According to Serife Turan et al (2021), the 5E teaching model is one of the teaching methods developed based on constructivism. Rodger W. Bybee and colleagues in the research team of the Biological Science Program in the US built a 5E model based on the three-stage learning cycle model: exploration, invention, and discovery. This model was proposed by Atkins and Karplus (1962). In Rodger W. Bybee's model, 5E represents the five stages of the lesson model: engage, explore, explain, elaborate, and evaluate. The 5E teaching model requires teachers to perform the following sequence of activities: introduce the lesson by drawing students' attention to a new concept; ask students to practice, explore a new idea or skill; explain the outcome of the concept being aimed at; build on each idea or skill through additional practice and ultimately measure student progress throughout the unit (Turan & Shirley M. Matteson, 2021).

Eng Tek Ong et al. (2021) show that the 5E model consists of five stages built by Rodger W. Bybee. The engagement phase includes activities that spark curiosity and recall students' pre-existing views on learning. The exploration phase, on the other hand, allows for a re-examination of the students' pre-instructed views. Based on the discovery in the second stage, students come up with a logical explanation for the problem posed, with the guidance of the teacher. The elaboration phase provides extended activities that allow students to consolidate and use newly acquired knowledge. Finally, student learning is commented on during the evaluation phase (Ong et al., 2021).

According to Nguyen Thanh Hai (2014), *"the 5E teaching model is a teaching model consisting of 5 stages: linking, surveying, explaining, reinforcing and evaluating. The five stages are built on the*

cognitive constructivism of the learning process, whereby students construct new knowledge based on previously known knowledge or experiences” (Hai, 2014).

Advantages and limitations of the 5E teaching model

Advantages

- Create interest in learning, encourage students' exploration, discovery, and creativity (Bahtaji, 2021).
- Develop practical skills, teamwork, problem-solving, cooperation, sharing (Salyani et al., 2020).
- Students have a positive attitude towards the subject.
- Improve student achievement (Grau et al., 2021; Ranjan & Padmanabhan, 2018).
- Form and develop the ability to think, reason, communicate in mathematics, and apply knowledge to solve practical problems (Rosdianto & Teeka, 2019; Zetriuslita & Uswatun, 2020).
- Create students' interest in the subject.
- Help students gain a deep understanding of the nature of concepts (Nopasari et al., 2020; Sartika & Hadi, 2021).
- Improve object mastery (Bakri & Adnan, 2021).
- Teachers have many materials to evaluate students.
- Improve teaching effectiveness and creativity of teachers (Turan & Shirley M. Matteson, 2021).

Limitations

- Teachers have difficulty with classroom management and time management. Teachers need to invest a lot of time and effort in preparing lessons according to the 5E teaching model (Metin et al., 2011; Polgampala et al., 2014).
- Teachers face many challenges in implementing the model phases in the classroom (Turan & Shirley M. Matteson, 2021).
- There are not enough resources to implement the 5E model in the classroom. For example, if a class has too many students, the 5E teaching model will be difficult to be effective (Iscan et al., 2015).
- Classrooms must have adequate facilities for students' hands-on experiences (Büyükkarci, 2020).
- Some students are still passive and do not participate in activities in the learning process and perform behaviors outside the assigned tasks (Althausen, 2018).

Teaching process according to the 5E model with the support of GeoGebra software

According to Rodger W. Bybee (1987), we have additionally edited and introduced the teaching process according to the 5E model with the help of GeoGebra software as follows:

Step 1: Engagement phase with the help of GeoGebra software

- Teachers organize activities to test students' knowledge about equilateral triangles, squares and equilateral hexagons. Students use GeoGebra software to draw illustrations.
- The teacher clearly identifies the problem students need to learn and explore.

Step 2: Exploration phase with the help of GeoGebra software

- The teacher instructs students to draw regular polygons using the number slider. Teachers set tasks for students to discover on their own about the concept and properties of regular polygons.
- The teacher guides students to create rotations using GeoGebra software. Teachers set tasks for students to learn and recognize rotation.

Step 3: Explanation phase with the help of GeoGebra software

- Students present and explain their findings and draw conclusions about regular polygons and rotations. Use GeoGebra software to illustrate and explain the conclusions.
- The teacher comments and generalizes the knowledge of the lesson.

Step 4: Elaboration phase with the help of GeoGebra software

- Teachers set activities for students to apply knowledge:
- Use regular polygons to draw the star lantern.
- Let's use regular polygons and the newly created rotation to draw decorative shapes.

Step 5: Evaluation phase with the help of GeoGebra software

- Teachers comment and evaluate students' results through activities.
- Teachers create activities for students to be creative.
- Students self-assess their knowledge through the lesson.

Example of applying 5E teaching model in recognizing regular polygons and rotations with the help of GeoGebra software**Example 1: Identify the shapes below:**

Figure 1. A traffic sign, a brick, a screw (Source: (Freepik, n.d.-b)).

Can you tell me about the edge and angle characteristics of the above figures?

Step 1: Engagement phase with the help of GeoGebra software

The teacher asks: Can you tell me what the above pictures look like?

Students answer:

- A traffic sign with an equilateral triangle shape.
- A brick in the shape of a square.
- A screw in the shape of a regular hexagon.

The teacher asks: Can you tell me about the features of the sides and angles of the figures above?

Students answer:

- The equilateral triangle has 3 equal sides and 3 equal angles that are 60 degrees.
- The square has 4 equal sides, 4 equal angles that are 90 degrees.
- The regular hexagon has 6 equal sides and 6 equal angles.

The teacher's request: Use GeoGebra software to draw equilateral triangles, squares, and hexagons.

Students: Self-practice drawing on GeoGebra software.

+ Select the icon:  Regular Polygon

Select 2 points and enter the number of vertices of the polygon

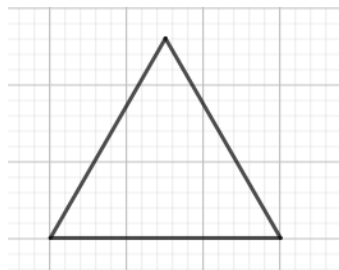
Regular Polygon

Vertices

3

CANCEL OK

+ The result obtained:



Do the same operations and enter the number of vertices 4 and 6 respectively to get a square and a regular hexagon.

Teacher: The figures above are called regular polygons.

Step 2: Exploration phase with the help of GeoGebra software

Teacher: Instruct students to draw regular polygons using the number slider.

+ Select the icon:  Slider

Choose where to place the slider and enter

Slider

Name

n

☒ Number ☐ Angle ☐ Integer

Interval		
Min	Max	Increment
3	30	1

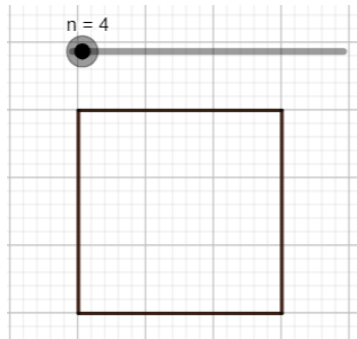
n = 3

+ The result obtained:

+ Select the icon:  Regular Polygon

Select 2 points and enter the number of vertices of the polygon as n . Now the number of vertices of the attached polygon is variable n , you can change the value of the variable n depending on the number of vertices of the polygon you want to draw by dragging and moving the dot on the slider.

Drag to change the slider value with $n = 3$, we get an equilateral triangle and with $n=4$, we get a square.



The teacher's request: Change the slider value n to form regular polygons with the number of vertices 5 (a regular pentagon), 6 (a regular hexagon).

Students: Listen and practice.

Teacher's request: Based on the software, determine the relationship between the lengths of the sides and the angles of a regular polygon.

Students:

- Determine the lengths of the sides of a regular polygon in the cases where the number of vertices is 5, 6,

+ Select the icon:  Distance or Length
Select the edge to calculate the length.

Conclusion: All cases give the result: the lengths of the sides of the polygon are equal.

- Determine the measure of the angles of a regular polygon in the cases where the number of vertices is 5, 6,

+ Select the icon:  Angle
Select 3 points or 2 lines forming an angle.

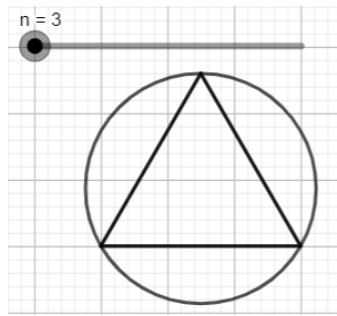
Conclusion: All cases give the result: the measures of the angles of the polygon are equal.

Teacher asks: Do regular polygons have circumscribed and inscribed circles?

Students:

- Determine the circumcircle

+ Select the icon:  Circle through 3 Points
Select 3 points on the circle.
+ We get the result:



Change the value of the n slider to see the cases where the polygons have 4, 5, 6,... vertices.

Conclusion: All polygons have a circumcircle.

- Determine the incircle

+ Draw the bisector of the angles

Select the icon:  Angle Bisector

Select three points or two lines that form an angle.

+ Select the icon:  Intersect

Select two objects or their intersection.

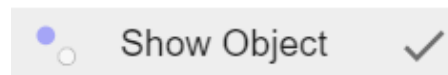
Draw the intersection of the bisectors. Draw the intersection P of a bisector with the side of the polygon.

+ Draw a circle when knowing the center and a point on the circle

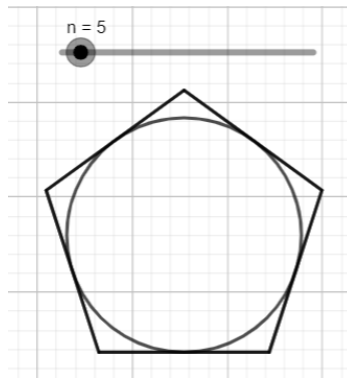
Select the icon:  Circle with Centre through Point

Select the center as the intersection of the bisectors, and select the intersection P on the edge of the polygon.

+ Hide unnecessary objects: select the object then right-click and uncheck in the object display.



+ We get the result:



Do the same for other cases of regular polygons.

Conclusion: Regular polygons have an inscribed circle.

Teacher: Guide students to create rotations using GeoGebra software.

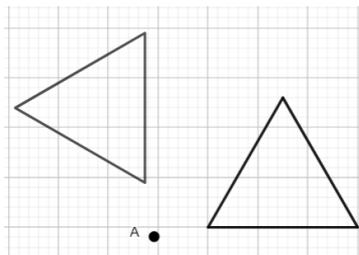
+ Select the icon:  Point

Create any point A

+ Select the icon:  Rotate around Point

Click to select the object to rotate (regular polygon), select the center of rotation (point A) and enter the rotation angle measure of 90° (you can choose rotation in the same or counterclockwise direction).

We get the result:



Students: Listen and practice.

Teacher's request: Create an angle slider to change the measurement of the rotation angle.

Students: Practice

- Create an angle slider to change the angle measurement.

+ Select the icon:  Slider

Select where to place the slider and enter

Slider

Name
t

☐ Number ☒ Angle ☐ Integer

Interval	Slider	Animation
Min 0°	Max 360°	Increment 1°

CANCEL OK

+ Select the icon:  Rotate around Point

Select the regular polygon, select the center of rotation (point A) and enter the rotation angle t . Now that the rotation measure of the rotation is set as the variable t , the value of the variable t can be changed according to the measurement of the rotation angle by dragging and moving the dot on the slider.

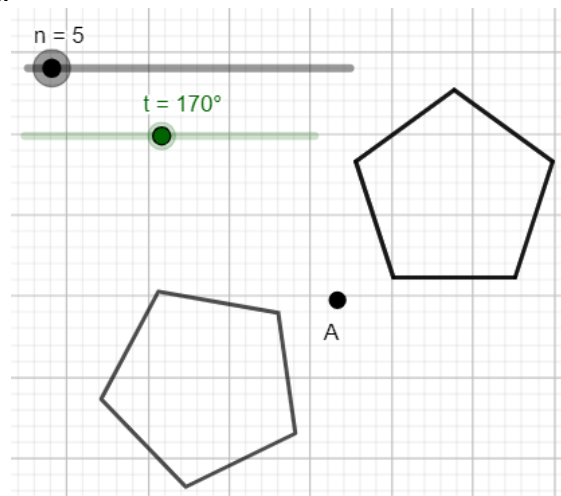
Rotate around Point

Angle
t

☒ anticlockwise ☐ clockwise

CANCEL OK

+ We get the result:



Teacher's request: Change the value of the slider t to observe the change in the position of the regular polygon formed in the rotation with the cases with different rotation measurements.

Students: Move the dot slider to change the value of n and t to observe the cases.

The teacher asks:

- Compare the size of the regular polygon formed (image) after the rotation with the original regular polygon?
- When is the rotation of an object determined?

Students answer:

- In rotation, the regular polygon formed after the rotation is equal to the original regular polygon.
- The rotation is determined when the center and the angle of rotation are known.

Step 3: Explanation phase with the help of GeoGebra software

The teacher asks:

- What is the concept of regular polygons?
- What are some properties of regular polygons?

Students answer:

- Students present the drawings they have made with GeoGebra software to explain and draw conclusions:
- A regular polygon is a polygon with all sides and angles equal.
- All regular polygons have an inscribed and circumscribed circle.

The teacher asks:

What are some characteristics of rotation?

Students answer:

- Rotation turns a regular polygon into a regular polygon that is equal to it.
- The rotation is determined when the center and the angle of rotation are known.

Teacher: Comment and conclusion.

Step 4: Elaboration phase with the help of GeoGebra software

The teacher asks: Use regular polygons to draw a star lantern.

The student:

- Draw an equilateral pentagon

Select the icon:  Regular Polygon

Enter the number of points as 5.

- Draw the diagonals of the regular pentagon.

Select the icon:  Segment
Select 2 points.

- Draw the circumcircle of the regular pentagon

Select the icon:  Circle through 3 Points

Select 3 points on the circle.

- Hide objects: points, regular pentagons (select objects, right-click and untick in the display of objects)
- Customize the color, display style for the object: select the object, right-click and select

the icon:  Settings

Insert more images: (images can be downloaded from the website: <https://www.freepik.com/>)

Select the icon:  Image

Click the *Choose file* icon to select the image to insert.

Image

File

Webcam

Choose File

No file chosen

Then adjust the size and position of the image to be reasonable and balanced.

Result:



Figure 2. A person (Source: (Freepik, n.d.-a)).

The teacher asks: Make a rotation of regular polygons with the center of rotation being any vertex of the regular polygon, any rotation angle t , and the rotation direction counterclockwise.

Students: Self-practice on the software

- Create a number slider n

Select the icon:  Slider

Select the position of the slider and enter the name n , the minimum is 3, the maximum is 30, the increment is 1.

- Draw regular polygons:

Select the icon:  Regular Polygon

Choose any two points and enter the number of vertices of the polygon as n .

- Create an angle slider

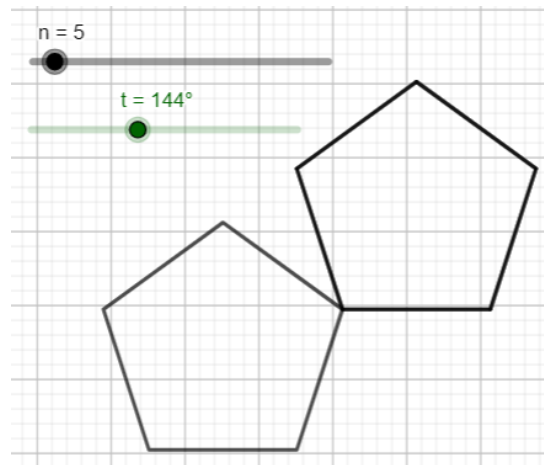
Select the icon:  Slider

Select the slider position and enter the name t , the minimum is 0° , the maximum is 360° , the increment is 1.

- Create rotation:

Select the icon:  Rotate around Point

Click to select the object to rotate (regular polygon), select the rotation center (vertex A of the regular polygon), enter the rotation angle measure t , and select the rotation direction counterclockwise. Drag the dot on the n , t slider to change the variable's values. We get the result:



Teacher: Use the regular polygon and rotation you just created to draw the ornament.

Instructions:

- Create a number slider d

Select the icon:  Slider

Select the slider position and enter the name d , the minimum is 0, the maximum is 100, the increment is 1.

- Create a sequence of regular polygons formed in rotation with rotation angle t multiplied by k . Use the Sequence function with the variable k , the number from 0 to d (the number of images formed is equal to the variable d).

In the function input bar, select:

$\text{poly1}' = \text{Rotate}(\text{poly1}, t, A)$

and edit to:

$\text{Sequence}(\text{Rotate}(\text{poly1}, t, A), k, 0, d)$

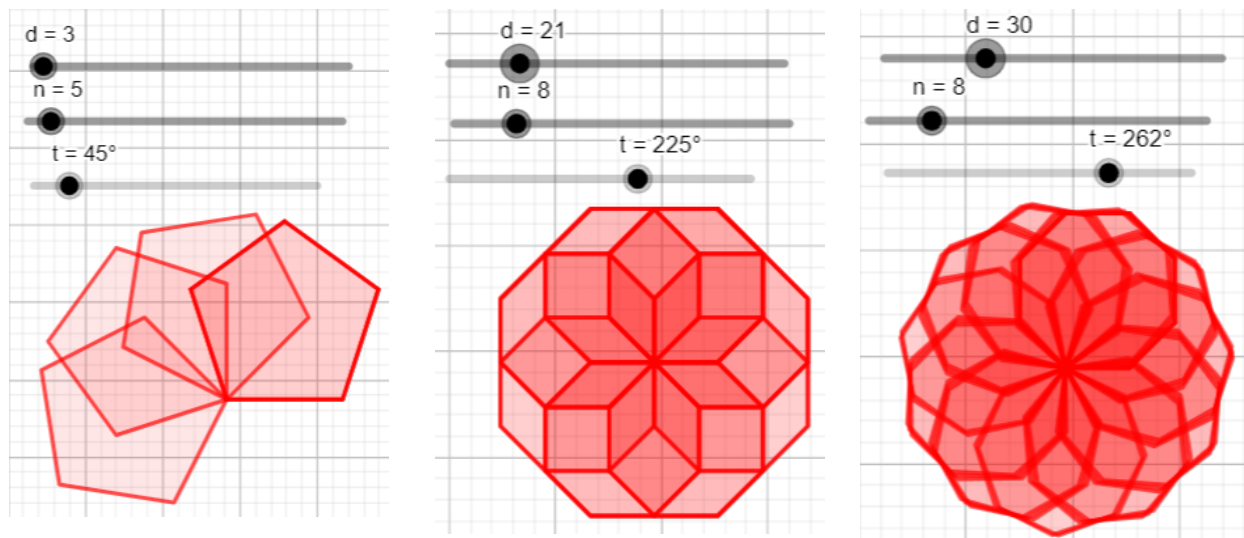
(Lee, n.d, 2019)

- Customize the color, display style for the object: select the object, right-click and select the

icon  Settings

- Hide point objects (select an object, right-click and uncheck in object display).

- Drag moving the dot on the sliders n , d , t to change the values of the variable, we get the following results:

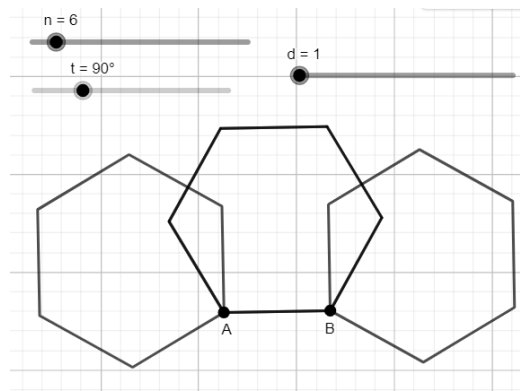


Students: Listen and practice.

Teacher's request: Do the same for the case of clockwise and anti-clockwise rotation with the center of rotation being any vertex of the regular polygon, rotation angle t .

Students practice

- When performing rotation with center point A, rotation angle 90° , counterclockwise rotation, and rotation with center point B, rotation angle 90° , clockwise rotation. We get the result:



- In the function input bar, select:

$\text{poly1}' = \text{Rotate}(\text{poly1}, t, A)$

$\text{poly1}'_1 = \text{Rotate}(\text{poly1}, -t, B)$

and edit to:

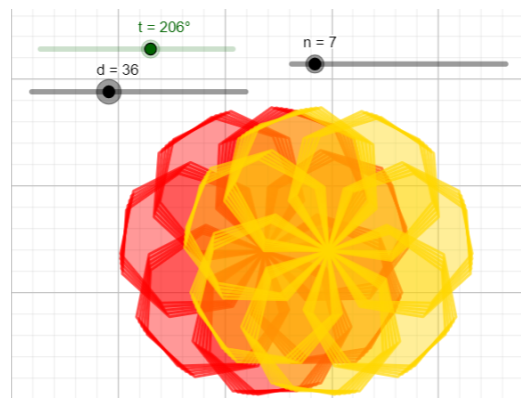
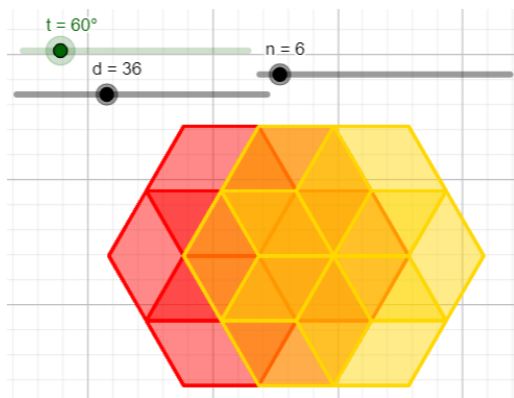
$\text{Sequence}(\text{Rotate}(\text{poly1}, t, k, A), k, 0, d)$

$\text{Sequence}(\text{Rotate}(\text{poly1}, -t, k, B), k, 0, d)$

- Customize the color and display style for the object: select the object, right-click and select the icon  Settings

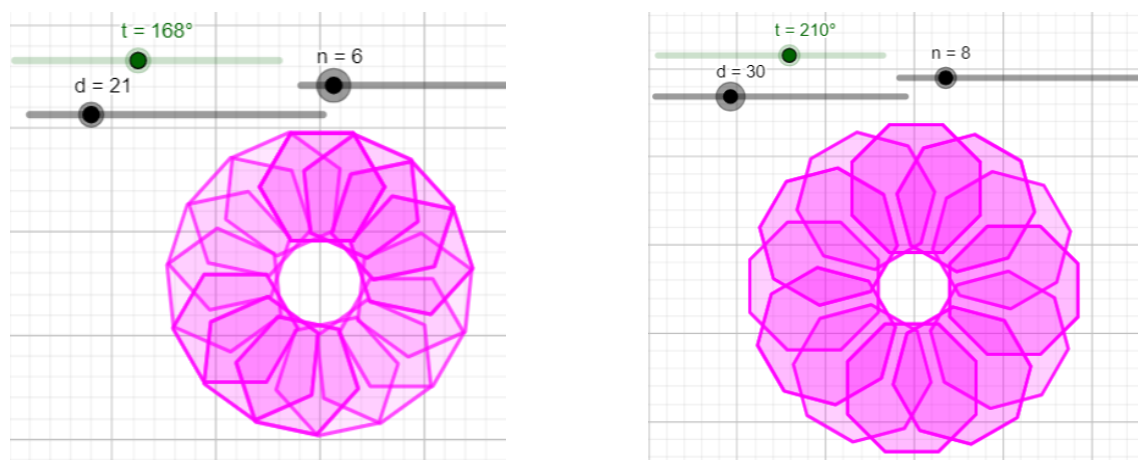
- Hide point objects (select object, right-click and uncheck in object display)

- Move the dot on the sliders n , d , t to change the values of the variables n , d , t we get the following results:



Teacher's request: Use regular polygons and rotations with the center at any point not belonging to the regular polygon, rotation angle t , counterclockwise rotation to draw decorative shapes.

Students: Practice on their own and get results:



Step 5: Evaluation phase with the help of GeoGebra software

Teacher: Comment and evaluate students' results through activities.
Use regular polygons and rotations to create other drawings in GeoGebra software.
What have you learned from this lesson?

Students: Receive the teacher's ideas and answer questions.

DISCUSSION

We experimented in the school year 2020-2021, at the Olympic Sports Gifted High School (Thu Duc City, Ho Chi Minh City, Vietnam) following the advanced learning program in Vietnam:

- Experimental class 9A1 includes 52 students. Math teacher: Bui Thi Giang.
- Control class 9A2 consists of 50 students. Math teacher: Bui Thi Giang.

We conducted a quantitative analysis of students' test results to verify the effectiveness and feasibility of the experiment using SPSS software. We have a summary of the scores in Table 1.

Table 1. Frequency distribution table of post-test scores of experimental and control classes in SPSS

		Scores								Total
		3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0	
Class	Experimental	1	4	8	9	9	13	6	2	52
	Control	2	7	9	13	7	8	3	1	50
Total		3	11	17	22	16	21	9	3	102

The experimental class has 90% average scores or higher, of which 57.6% are quite good (scores from 7 or higher), 2 students get perfect scores, 6 students get 9 points.

The control class has 82% scores from average or higher, of which 38% get quite good scores (scores from 7 or higher), 1 student get a perfect score, 3 students get 9 points.

From the above data, we have chart 1 to compare the test results of the two classes:

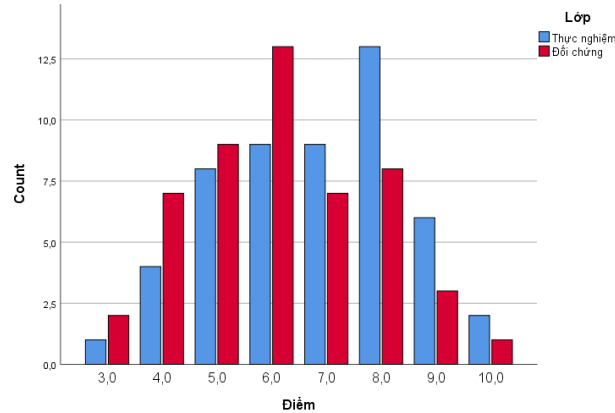


Chart 1. Column chart comparing post-test scores of experimental and control classes in SPSS.

Looking at chart 1, we can see that the height of the point columns and the distribution of points of the two classes are not equal, there is a difference in the distribution of points. Both classes have a score of 3-10. The scores of the experimental class are 5-9 points, most of which are 8 points. The scores of the control class are from 4-8 points and most are 6 points.

Besides, we also get Table 2 showing the characteristic parameters of statistics as follows:

Table 2. Table of characteristic parameters of statistics on post-test scores of experimental and control classes in SPSS

		Scores		
		Mean	Variance	Standard Deviation
Class	Experimental	6,8	2,9	1,7
	Control	6,1	2,8	1,7

From the above data, it can be seen that the mean scores of the two classes are significantly different.

The average score of the two classes is: $\overline{X_{TN}} = 6,8$; $\overline{X_{DC}} = 6,1$. The experimental class has a higher average score than the control class. Looking at the variances and standard deviations of the two classes being similar, we can say that the concentration on the mean scores of the two classes is very high and similar. From that, we can make the conclusion that the score of the experimental class is higher than the control class.

However, to ensure the accuracy of the high and low between the mean scores of the two classes, we conduct the average test between the two classes, with the significance level $\alpha = 0,05$ shown in Table 3 with the following two assumptions:

Assumption

H_0 : "The average scores of experimental and control classes are similar".

H_1 : "The average score of experimental class is higher than that of control class".

Table 3. T-test table of post-test scores of experimental and control classes in SPSS.

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Scores	Equal variances assumed	,186	,667	2,007	100	,047	,6677	,3327	,0077	1,3277
	Equal variances not assumed			2,008	99,943	,047	,6677	,3326	,0079	1,3275

Reading the data in Table 3, we have:

- Levene test with value $Sig. = 0,667 > \alpha = 0,05$ we have the same variance of two classes, using Independent-samples T-test results corresponding to the case where the equal variances of two samples are assumed.

- Independent-samples T-test has $Sig.(2-tailed) = 0.047 < \alpha = 0,05$, so we reject hypothesis H_0 , accept hypothesis H_1 . Therefore, the mean score of the experimental class is higher than the control class with a 5% significance level.

Thus, by the test method between classes with equivalent academic ability, the results show that the experimental class after being taught according to the experimental lesson plan has better results, the average score is higher than that of the control class. It can be seen that the process applied to the experimental class is completely feasible and effective in teaching.

CONCLUSION

The 5E teaching model is a teaching method that helps learners experience and discover. Through learning activities with the support of GeoGebra software, learners create knowledge for themselves. Teachers in teaching according to the 5E model play the role of a guide, a helper, not a one-way knowledge transmitter. The teacher takes more effort but the teaching effect is better than the traditional teaching method in which teachers dictate to their students. Students show interest, dynamism and mobilize all their knowledge and experience to gain knowledge. Because of the active acquisition of knowledge, students will remember it longer. Experiments show that the 5E teaching model with the support of GeoGebra software is effective in teaching recognition of regular polygons and rotations. Thanks to the outstanding features, the teaching product attracts the active participation of students. Students easily understand and absorb the lesson. Students with the help of teachers also easily build their own shapes to get new results. Students enjoy the lesson and are more enthusiastic in class.

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