All Sciences Proceedings

2nd International Conference on Contemporary Academic Research

November 4-5, 2023 : Konya, Turkey

ICCAR

All Sciences Proceedings
http://as-proceeding.com/

© 2023 Published by All Sciences Proceedings

https://as-proceeding.com/index.php/iccar

Examining the Learning and Teaching Process with Classroom Activities in the Geometry Teaching Process

Fatma Cumhur*[1]

[1]Mathematics and Science Eductaion, Mus Alparslan University, Turkey

*cumhurfatma@gmail.com

Abstract – In this study, it is aimed to examine the learning-teaching process with the activities carried out in the classroom during the geometry teaching process. For this purpose, data collection took place in three stages: observation of the teacher's activities in the classroom, interviews with teachers, and interviews with students. The research was conducted in two public schools, involving 3 teachers and 120 students. As a result of the analysis of the data, it was seen that the teachers found the activities positive and tried to minimize the limitations (time, equipment, classroom control, etc.) and include activities in geometry teaching. It has been observed that students need more visual themed activities in their geometry education and thus their learning increases positively. As a result of the study, it is recommended that smart boards be used more in subjects where visuality is at the forefront, such as geometry.

Keywords – Geometry Teaching, Learning, Activity, Classroom, Process

I. INTRODUCTION

What to teach in school mathematics and how to teach it have been the subject of many studies (Karataş, 2005; Kılıç, 2015). This importance increases even more when it comes to geometry. Geometry, which is a learning area of mathematics, has an important place in terms of being encountered in real life in many ways and developing certain skills. In this sense, in-class activities play an important role in how this course will be taught. The activity is to present the topics in the learning process to students in a fun and interesting way by concretizing them. The purpose of the activities is to attract the student's attention, activate their perception and motivate them (Bozkurt, 2018). Children have many experiences with geometry before they start school, and they have the opportunity to develop these experiences throughout their school years. These experiences that they encounter before they start school or during their school years form the basis of the geometry experiences they will learn in later years (Aslan & Aktaş Arnas , 2004). For this reason, it is preferred that the experiences that children encounter during their school years are educational and at the desired level, in accordance with school mathematics.

Geometric objects and shapes, their properties and their relationships with each other are the sub-learning areas of geometry, and students are faced with these subjects in all school years (Dağlı & Peker, 2012). Especially in the first years of primary education, it is recommended to carry out activities such as recognizing geometric objects and shapes, naming them, building them, drawing them, comparing them and grouping them according to certain characteristics (Gündoğdu Alaylı & Türnüklü, 2014) . Thus, it becomes easier for students to associate the concepts and terms studied as abstractions in geometry with the objects they see around them. It is thought that analyzing the shapes encountered in daily life, recognizing different geometric shapes and establishing relationships between them will contribute to students' learning geometry. In addition, it is obvious that using dynamic software in lessons and revealing different theoretical relationships will affect permanent and

meaningful learning in geometry (Günhan & Açan, 2016; Güven & Karataş, 2003). It is thought that these and many similar activities will help students see geometry as a part of daily life and realize the artistic side of geometry.

The main point to be considered in the field of geometry is that mental freedom and mental power are used effectively in understanding geometric relationships (Toptaş, 2008). In the applications carried out, how and by which methods the students understand the subject should be considered as the main question of the research topic, and activities that can help students create the most comfortable learning styles should be included. In this study , the activities carried out in the classroom and the learning-teaching processes are examined in the teaching process of " *geometric objects and shapes* " and " *basic concepts in geometry"*, which are the geometry sub-learning areas of the 6th and 7th grades in the primary school mathematics course (5-8) curriculum. It is aimed to reveal how effective the activities included in teaching geometry are.

II. Materials and Method

This study is about the activities used in the classroom and the teaching-learning process in the geometry teaching process of students. For this purpose, in order to realize the subject of the research, observations and practices were made in the 6th and 7th grade classes of two different schools to help our research. In this sense, the study was designed according to the case study method.

A. Participants of the Study

The participants of the research consist of 3 teachers and 120 students. While trying to reveal the activities exhibited by the teachers, interviews were held simultaneously with a total of 120 students taught by these teachers. The demographic characteristics of the teachers participating in the research are stated below.

Table 1. Demographic characteristics of the teachers

Teachers and characteristics	**T1**	**T2**	**T3**
Age	29	28	30
Experience	7 years	4 years	5 years
Observed classes and lesson time	6^{th} grades 30 hours	7^{th} grades 28 hours	7^{th} grades 24 hours
Observed topics	Area measurement (8) Volume measurement (8) Measuring in liquids (6) Circle (8)	Angles in line (8) Angles in a circle (10) Area in apartment (10)	Length in circle (12) Area in apartment (12)

B. Collection of Data

Fig Interview and observation techniques were used in the research. In the observation technique, the general course process of the mentor teacher was followed for an average of 5-6 hours a week and it was tried to determine what kind of activities he included. For this purpose, the teacher's lesson process; The materials used were observed in the context of the worksheet, analogies, examples, dialogues with the student or other methods and techniques used, and necessary records were taken. During the observation, the dialogues in the lesson were audio-recorded and reported as in the findings. At the end of the course, face-to-face interviews were held with the teacher to obtain information about the teaching process. During the interviews with the students, students' thoughts and opinions about the activities were tried to be determined with the help of 10 open-ended questions.

C. Analysis of Data

In the analysis of the data, first the course contents of the observed teachers were examined. In this review, especially all the activities used by teachers in the lesson; The material was examined in the context of the methods and techniques used, such as analogy and worksheets. The teacher's dialogues with the students during the activities were highlighted and these dialogues were analysed descriptively. On the other hand, the opinions obtained from teachers and students were subjected to content analysis and some sections of these opinions were included in the findings section.

III. RESULTS

The most important features and trends in the results should be described but should not interpreted in detail.

In this section, the findings are discussed in three parts: student opinions, teaching process and teacher opinions.

A. Student Opinions

This section contains the findings of the numerical analysis of student opinions and explanations of these findings. The opinions obtained from 10 open-ended questions asked to the students are presented separately for each question. The findings obtained from the students' answers to the first question are given in Table 2.

Table 2. The methods and techniques most used by teachers in teaching geometry

	N	%
Smart board	80	66.6%
Video assisted teaching	52	43.3%
Whiteboard	36	30%
Materials	27	22.5%

When Table 2 is examined, it is seen that most of the students (N = 80, 66.6%) answered smart board to the methods most used by teachers. 52 students (43.3%) answered that they mostly use video-supported teaching applications. While 36 students (30%) saw the use of materials more, 27 students (22.5%) said that they used whiteboard more in geometry learning. The findings obtained from the students' answers to the second question are given in Table 3.

Table 3. The benefits of the methods and techniques used by the teacher

	N	%
Yes	105	87.5%
Partially	9	7.5%
No	6	5.0%

When student responses are examined according to Table 3, most of the students (N=105, 87.5%) thought that the methods and materials used by their teachers in learning geometry had a positive impact on their learning processes. While 9 students (7.5%) were undecided about how the methods and techniques used affected their learning processes, 6 students saw the methods used by their teachers as useless. The findings obtained from the students' answers to the third question are given in Table 4.

Table 4. Methods and techniques preferred by students in geometry course

	N	%
Smart board	85	70.8%
Video assisted teaching	72	60%
whiteboard	34	28.3%
materials	33	27.5%
Question answer	51	42.5%
Brainstorming	29	24.1%

When the student responses are examined according to Table 4, it is seen that most of the students (N = 85, 70.8%) prefer the smart board, one of the methods used by their teachers in learning geometry. 72 students (60%) preferred the video-assisted learning process. 34 students (28.3%) preferred the whiteboard application. 33 students (27.5%) thought that the materials were more appropriate. 51 students (42.5%) preferred the question-answer application. 29 students (24.1%) found brainstorming appropriate. The findings obtained from the students' answers to the fourth question are given in Table 5.

Table 5. Use of activities used in teaching geometry in other courses

	N	%
Yes	98	81.6%
Partially	13	10.8%
No	9	7.5%

When student responses are examined according to the table, most of the students (N=98, 81.6%) wanted their teachers to use the activities used in geometry learning in other subjects as well. Thirteen students (10.8%) appear to have doubts about whether their teachers should use the activities they use in other subjects. Nine (7.5%) students did not want their teachers to use the activities they used in the geometry learning process in other subjects. The findings obtained from the students' answers to the fifth question are given in Table 6.

Table 6. Whether the teacher uses attention-grabbing analogies while teaching geometry

	N	%
Yes	95	79.1%
Partially	17	14.1%
No	8	6.6%

When student responses are examined according to Table 6, most of the students (N=95, 79.1%) thought that their teachers used analogies in learning geometry and that these analogies were beneficial. Seventeen students (14.1%) were undecided about

whether their teachers would benefit from analogies when they used them. Eight (6.6%) students thought that their teachers' analogies did not benefit them in their geometry learning process. The findings obtained from the students' answers to the sixth question are given in Table 7.

Table 7. In which classes knowing geometry is useful?

	N	%
Social studies	20	16.6%
science and technology	47	39.1%
Turkish	5	4.1%
Physical education	16	13.3%
English	5	4.1%
Visual arts	72	60.0%

When student responses are examined according to Table 7, most of the students (N=72, 60.0%) think that the information they learned in geometry was useful in the visual arts course. Forty-seven students (39.1%) said that the information they learned in geometry was useful in science and technology classes. Twenty students (16.6%) said that the information they learned in geometry was useful in social studies class. Sixteen students (13.3%) said that the information they learned in geometry was useful in physical education class. Five students (4.1%) said that the information they learned in geometry was useful in Turkish-English lessons. The findings obtained from the students' answers to the seventh question are given in Table 8.

Table 8. Activity tools intended to be used in teaching geometry

	N	%
Games	64	53.3%
materials	35	29.1%
Movie, Video	49	40.8%
Smart Board Assistance (EBA, MORPA, ARI)	69	57.5%
Whiteboard	21	17.5%

When student responses are examined according to Table 8, it is seen that most of the students (N = 69, 57.5%) prefer the smart board, one of the methods used by their teachers in learning geometry. Sixty-four students (53.3%) preferred the learning process through games. Forty-nine (40.8%) thought that movies and videos helped them learn. Thirty-five students (29.1%) selected the material option among the methods used by their teachers. Twenty-one students (17.5%) thought that the whiteboard helped them learn more. The findings obtained from the students' answers to the eighth question are given in Table 9.

Table 9. Which of the activities the teacher does in teaching geometry encourages them to study?

	N	%
Daily Life Examples	52	43.3%
Use of Materials	23	19.1%
Learning with Games	43	35.8%
Using the Smart Board	68	56.6%
Learning by Doing	22	18.3%
Watching Videos	38	31.6%

When student responses are examined according to Table 9, most of the students (N=68, 56.6%) said that using smart boards, one of the methods used by their teachers in learning geometry, encouraged them to study. Fifty-two students (43.3%) said that daily life problems, one of the methods used by their teachers in learning geometry, encouraged them to study geometry. Forty-three students (35.8) said that learning through games, one of the methods used by their teachers in learning geometry, encouraged them to study geometry. Thirty-eight students (31.6%) said that watching videos, one of the methods used by their teachers in learning geometry, encouraged them to study geometry. Twenty-three students (19.1%) said that the use of materials, one of the methods used by their teachers in learning geometry, encouraged them to study geometry. Twenty-two students (18.3) said that learning by doing, one of the methods used by their teachers in learning geometry, encouraged them to study geometry. The findings obtained from the students' answers to the ninth question are given in Table 10.

Table 10. Whether or not the teacher's activities come to mind while solving geometry questions

	N	%
Yes	91	75.8%
Partially	22	18.3%
No	9	7.5%

Table 10, most of the students (N=91, 75.8%) said that they were able to produce solutions based on the activities used by their teachers in learning geometry. Twenty-two students (18.3%) were undecided about whether they could produce solutions based on the activities used by their teachers in learning geometry. Nine students (7.5%) stated that they could not produce solutions based on the activities used by their teachers in learning

geometry. The findings obtained from the students' answers to the tenth question are given in Table 11.

Table 11. Whether the activities carried out in lessons in geometry teaching are beneficial to learning

	N	%
Yes	103	85.8%
Partially	11th	9.2%
No	6	5%

When student responses are examined according to Table 11, most of the students (N=103, 85.8%) thought that the activities used by their teachers in learning geometry helped them learn the subject. Eleven students (9.2%) were undecided about whether the activities used by their teachers in learning geometry would help them learn the subject. Six students (5%) thought that the activities used by their teachers in learning geometry did not help them learn the subject.

According to the findings obtained from the students' answers to the eleventh open-ended question, when student answers are considered in general, it is seen that the students mostly prefer the use of video-assisted teaching in the course. Other preferences of the students are, in order (from most to least), games, smart boards and whiteboards. Very few students preferred the teacher to teach with a straight lecture method.

B. Teaching Process

In this section, the activities used by a teacher observed during the teaching process of a course are discussed in the context of the dialogues between the teacher and the student and sample sections are included. These dialogues were discussed in the context of the attention-grabbing phase of the lesson and the process of focusing on geometric shapes, and necessary explanations were included.

Attracting attention:

While discussing the subject of polygons, the teacher carried out the process of attracting attention as follows:

Teacher: (The teacher enters the lesson and starts the lesson by asking the first question.) Today's topic is regular polygons, friends. What do you think regular polygon means, friends?

Student 1: If it has more than three sides, it is a polygon.

Student 2: If the number of sides and angle measures are equal, it is a regular polygon.

Student 3: No, can I say it, teacher?

Teacher: Say

Student: Teacher, if the sum of more than three sides and exterior angles is 360 degrees, it is a regular polygon.

Student 4: Teacher, shapes with three or more corners are called shapes.

Student 5: Teacher, it is called the one whose lengths are equal to the side.

Student 6: If the sum of an interior angle and an exterior angle is 180

Teacher: (Turning to Student 5) Say it again.

Student 5: Teacher, if the lengths and angles are equal, it is a regular polygon.

Teacher: Yes, friends, how do we know that a shape is a polygon? First, there must be lines joined by more than two line segments. So it's going to be edge, corner, and it's going to be a closed shape. For example; We call triangles, quadrilaterals, pentagons and similar shapes polygons. The sum of the exterior angles of all polygons is 360 degrees. For example, isn't the sum of the exterior angles of a triangle 360 degrees?

Students: Yes!

Teacher: Well, isn't the square 360? Isn't your quadrilateral 360?

Students: Yes!

Teacher: So what is the sum of the exterior angles of all polygons?

Students: 360, teacher.

Teacher: In all polygons, the sum of an interior angle and its exterior angle is 180 degrees. Because these are adjacent complementary angles. Now we said what is in regular polygons? As we said, we call a closed shape consisting of sides and angles a polygon. We call regular polygons polygons whose side lengths and angles are equal. So what must happen for a shape to become a regular polygon?

Students: (In unison) Side lengths and angles must be equal.

According to the dialogue, the teacher says the students are ready. It is understood that he wants to measure the level of presence with the question-answer method. Students' opinions were taken, regardless of whether they were right or wrong, and they were given the opportunity to question their own answers based on the answers given by their other friends. The fact that the teacher explained the topics in the form of questions and answers in this way made the students' participation in the lesson

more effective. Thus, students were able to easily pay attention to some special concepts and easily remember the information they had previously learned about the subject of polygons. Thus, this formed the basis for a better execution of the course process and for students to structure new information by associating it with previous information.

The process of focusing on geometric shapes:

7th grade students' geometry course focused on geometric shapes while discussing the subject of polygons as follows:

> *Introduces the lesson by simulating geometric objects with real life and tools in the classroom in order to focus the attention of the students on their readiness and motivation.*
>
> *Teacher: Dear students, what comes to our mind when geometric shapes are mentioned? Let's think a little, friends.*
>
> *Student: Complex and complex shapes.*
>
> *Teacher: So, can anyone give examples of these complex shapes?*
>
> *Student: (with some hesitation) Sir, we can show some tools in the classroom as examples.*
>
> *Teacher: For example?*
>
> *Student: We can show the blackboard or the desk as an example.*
>
> *Teacher: So, can you tell me what kind of complex shape the classroom blackboard is?*
>
> *Student: Not only the blackboard but also the circular four seasons chart is a bit complicated.*
>
> *Teacher: Yes, friends, geometric shapes are somewhat complex structures. So why do you find the shapes so complicated?*
>
> *Student: Because we can only make simulations. Because the extensions of the shapes are not reinforced with other shapes.*
>
> *Teacher: Then can you color the same sides of the shapes and distinguish them?*
>
> *Student: Of course, the shapes are a little more similar.*
>
> *Teacher: How can you distinguish between a circle and a circle?*
>
> *Student: Aren't circle and circle the same shapes anyway, teacher?*
>
> *Teacher: No it is not. The circle is empty and the circle is a filled shape.*
>
> *Student: We understand, teacher. Let's not paint inside the circle, let's paint inside the circle, then we can distinguish it better.*
>
> *Teacher: Can you give an example of a circle and a circle?*
>
> *Student: If a circular bicycle tire is a circle, can't the dish be shaped like a satellite?*
>
> *Teacher: Can anyone give another example?*
>
> *Student: No, sir.*
>
> *Teacher: Let me give you an example, then you will understand it better. Since the circle is hollow, we can compare it to a ring, and the circle is like a coin because it is solid.*
>
> *Student: Okay, we understand, sir.*

In the above dialogue, coloring was done so that the students could better understand the visual aspects between the shapes, and it was observed that some concepts, by associating them with real life, left a more accurate and lasting impression on their thoughts. It is seen that students' full understanding of concrete ideas provides a basis for abstract thinking skills. Students' analogy of shapes with real life contributed to their realistic approach to problems. Therefore, the activities carried out during the lesson on geometric shapes in this course, painting the sides of the shapes with each other during the painting process and distinguishing between the shapes, formed the lower stage of the development of students' concrete thinking skills and abstract thinking, and at the same time reconciled the imagination of the students and the harmony between them.

C. Teacher Opinions

Below are the interview questions directed to secondary school teachers regarding the geometry teaching process. The findings regarding the activities used in teaching geometry during the interview, the questions asked to secondary school teachers in order to see to what extent these activities affect the geometry teaching process, the answers given and the examination of the processes are given below.

Do you think it is appropriate to teach geometry through activities?

> *T1: I think it is appropriate. Because it is very useful to use activities or different methods to help students make sense of the subject in geometry teaching, to create a schema in students' minds or to explain it with diagrams.*

T2: Geometry subjects have a structure that can be better understood through activities. Subjects are better understood through grounded teaching involving the whole class.

In your opinion, what are the most effective methods and activities that can be used in the geometry teaching process?

T1: Since these methods and activities are mostly based on games and similar things, they can be even more meaningful when presented to the student with smart boards and materials.

T2: Activity based, learning by doing, station, group etc.

T3: Showing videos from MORPA, asking questions to students and reinforcing the topic.

What reasons make you think these activities are effective?

T1: Because when we use these activities, students' interest in the lesson increases, and when their interest increases, it inevitably becomes easier for them to understand the lesson, and the lesson becomes more eye-catching for the students, and the student listens to the lesson more lively.

T2: In some questions and topics, a student may not understand at the same level. I think they gain self-confidence when they support their friends who are behind them with group work and the explanation of someone at their own level.

T3: There is more participation in question solving. Likewise, an increase in exam scores is observed.

To what extent do you implement these activities that we consider effective?

T1: In other words, we try to use and implement it as much as possible, but of course there are times when we cannot implement it when the number of students and the resources we have are insufficient.

T2: We cannot apply it in most courses. Instead of an activity, I now apply and demonstrate geometry proofs and rules (via Geogebra).

To what extent do the activities you use help students learn?

T1: As I said, students' learning becomes more permanent and easier. Because students can explain these with their own diagrams more easily through activities.

T2: With dynamic geometry software, students see the changes more clearly, and the student who is behind in group work compared to his friends understands the subject more effectively than his friends.

T3: Since each student's level is different, I see that there is a moderate level of learning at first. Learning increases in the following lessons.

Are there any limitations to the activities you use? What limitations, if any, do you think there are?

T1: Of course there is. For example, an activity may take time and create an environment where it may be difficult to control the class. At the same time, obtaining equipment and materials that can be used in the event can sometimes be a problem.

T2: There are not enough materials for the entire class for group work. Since students do not know how to use the dynamic geometry software, active participation is not provided.

T3: I try to prepare events to suit all levels and appeal to everyone.

What is the impact of the activities you use on students' success? Is it permanent?

T1: It is definitely effective on the student's success. As we mentioned, it has positive effects. Is it permanent? I think it's definitely permanent. Because, as we said, he can construct it better in his mind and place it in his mind even better.

T3: Students very quickly forget what they learned by seeing or hearing. However, the permanence of the topics learned by doing and experiencing in group studies is higher.

What problems do you encounter when applying activity-based work to students?

T1: As I mentioned before, there may be the possibility of not being able to control the class, not being able to provide the materials and equipment to be used in the activity, or going beyond the purpose of these activities.

T2: Because the class is divided into groups, there is not time to deal with all groups at the same level. There are also problems with classroom management.

T3: Due to the large class size, I have difficulty controlling the class during activities. Since the participation rate in the activities is high, chaos breaks out in the classroom. I'm having trouble finding material.

Is student participation in classroom activities sufficient?

T1: Of course, before implementing these activities, we need to determine whether they are suitable for the learning level of the students. If it is not suitable for the student's level, the student does not understand it and his/her participation in the lesson is very poor. As I said, participation in these activities is usually sufficient if we use things appropriate to their level.

T2: Every student participates in group activities willingly. Although they love such activities, occasionally there are students who do not want to participate in group work.

Do students enjoy doing the activities in geometry teaching?

T1: Of course. Because it is seen as a game for students and makes the subject more enjoyable. In this way, it can be said that students are offered a way to understand the lesson better without getting bored.
T2: As they learn geometry topics and begin to solve questions, students participate in activities with more pleasure.

When teachers' opinions are examined, it is said that structuring the geometry teaching process with activities makes teaching more permanent and effective, activities will be carried out more efficiently with group work, and activities make students' learning easier and more permanent. At the same time, it has been stated that these activities have some limitations and that these limitations negatively affect the activities to achieve the desired result. It was pointed out that some problems were encountered while implementing the activities, and the main one of these problems was classroom management. However, it has been stated that as students enjoy the activities, it is easier for them to achieve the purpose of the course and it makes students' learning more permanent.

IV. DISCUSSION AND CONCLUSION

When the geometry teaching process activities were examined, in order to understand the structure of the activities, teacher opinions, student opinions and the teacher's practices in the course were considered as a whole and discussed as follows.

Considering student opinions, we see that students want more activities to be done on smart boards. This shows that students can listen and learn the visualized curriculum more vividly. Activities provide an environment where students can achieve their cognitive development at the highest level, both in terms of visuality and activity. To evaluate the answers in general, students, like teachers, find lessons enriched with activities more attractive and meaningful. However, some limitations show that the activities are not included at the desired level. However, students, like teachers, think that activities provide success in lessons.

Considering the findings regarding teacher opinions and teacher-student dialogues, the teacher asking questions to the students and waiting for all students to answer with their own words was effective in terms of both measuring the students' knowledge about the subject and revealing their misconceptions about the subject. In this sense, it can be said that the applications included in the curriculum for the purpose of "will be able to easily express their own thoughts and reasoning in the problem-solving process and see the deficiencies or gaps in the reasoning of others" were used (Ministry of National Education [MEB], 2013). By trying to enable them to express their answers in mathematical words with short interventions , it is seen that practices aimed at "He will be able to use mathematical terminology and language correctly to explain and share his mathematical thoughts logically" in the curriculum are also included (MEB, 2013). After the question-answer technique used to introduce the subject, the teacher gave examples from the immediate environment, allowing the shapes to come to life more easily in the students' minds.

According to teachers' opinions; The functioning of the activities and the methods and techniques used are clearly emphasized in order to make the activities more successful and, as a result, to reach the expected level in a healthy way. Although teachers think that the activities are important and useful, they stated that they cannot use the activities sufficiently due to some limitations (time, equipment, classroom discipline, etc.). This is seen as a justified reason for teachers not being able to give much space to activities. When we look at teacher opinions in general, we see that all of the activities increase students' success and ensure the permanence of information. As a result, the fact that teachers, who are the heads of education, find the activities very useful shows how necessary and important the activities are for the educational life of the students.

In short, the positive thoughts of teachers and students, with whom the most interaction is provided in education and training, about the activities show that the activities should be free of limitations and applied on appropriate subjects. As a result of examining the activities in the teaching process, it reveals that activities should be an indispensable part of teaching.

V. SUGGESTIONS

1. Since teaching geometry with activities makes it easier for students to learn, teachers

can include different activities in their lessons.
2. Different types of activities (video, worksheets, group work, analogy, concrete materials, etc.) can also be applied in the classroom to attract students' attention.
3. Teachers can benefit more from technological opportunities, especially in teaching geometry.
4. Games suitable for geometry topics can be produced and implemented in classes.
5. Since student success varies from subject to subject, teachers can develop activities appropriate to the student's level and in line with the students' interests and abilities according to the theory of multiple intelligences.

REFERENCES

[1] Karataş, I. (2005). Constructivist Learning Environment Design with Dynamic Geometry Software Cabri: A model. *Elementary Education Online,* 4(1), 62-72.

[2] Kilic, C. (2015). The effect of teaching geometry according to Van Hiele levels in the 5th grade primary school mathematics course on students' academic achievements, attitudes and retention levels. Unpublished Doctoral Thesis, Anadolu University, Türkiye.

[3] Bozkurt, A. (2018). Evaluation of the activities in the secondary school 6th grade mathematics textbook in terms of purpose, student study style and applicability. *Electronic Journal of Social Sciences, 17* (66), 535-548.

[4] Aslan, D., & Aktaş Arnas, Y. (2004). Geometry in preschool period. *Education Science Society, 3* (9), 36-45.

[5] Dağlı, H., & Peker, M. (2012). What Do 5th Grade Primary School Students Know About Calculating the Perimeter of Geometric Shapes? *Journal of Theoretical Educational Journal of Science / Theoretical Educational Sciences, 5* (3).

[6] Gündoğdu Alaylı, F., & Türnüklü, E. (2014). The relationship between secondary school students' geometric shape formation levels and various variables. *Nineteen May university Journal of Education Faculty, 33* (2), 455-479.

[7] Günhan, B. C., & Açan, H. (2016). The effect of using dynamic geometry software on geometry success: A meta-analysis study. *Turkish Journal of Computer Oath Mathematics Education (TURCOMAT), 7* (1), 1-23.

[8] Güven, B., & Karataş, İ. (2003). Dynamic geometry software Learning geometry with cabri: student opinions. *the Turkish Online Journal of Educational Technology, 2* (2), 67-78.

[9] Toptaş, V. (2008). Examining the Teaching-Learning Process with Classroom Activities in Geometry Teaching. *elementary Education Online,* 7(1), 91-110.

[10] Ministry of National Education [MEB] (2013). Secondary School Mathematics Course Curriculum. Ankara.