THE EFFECT OF LEARNING GEOMETRY TOPICS OF 7TH GRADE IN PRIMARY EDUCATION WITH DYNAMIC GEOMETER'S SKETCHPAD GEOMETRY SOFTWARE TO SUCCESS AND RETENTION

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ABSTRACT
The aim of this study is to investigate the effect of learning geometry topics of 7th grade in primary education with dynamic geometer's sketchpad geometry software to student's success and retention. The experimental research design with The Posttest-Only Control Group was used in this study. In the experimental group, dynamic geometer's sketchpad geometry software adapted to Computer assisted instruction; and in the control group, traditional teaching method was used. Quantitative research approaches were adopted in the study. Data was collected through 6th grade SFBS (state free boarding and scholarship) 2005 test, achievement test and worksheets. Mann Whitney U test and Wilcoxon signed-rank test were used to analyze the quantitative data of the study. As a result of this study, it was found that there was a significant difference between achievement test scores of experimental group learning geometry with GSP dynamic geometry software and control group learning through traditional method in favor of experimental group.
Keywords: Learning geometry, dynamic geometry, GSP, geometry achievement, retention

INTRODUCTION

Besides affecting many areas, in our age, the rapid development of science and technology also affects the field of education in many aspects. Technology plays an important role in enriching the educational process. In the subject of new Technologies in education, one of the electronic tools recently worked on intensively is computer. With the development of computer technology, in mathematics education, the computer is taken as the basic element in almost every environment where the subject is reform movements. The intent of the appropriate use of the computer in mathematics education must be computer's helping providing students develop high-level skills and encouraging the students to establish their own mathematics by letting them gain his/her mathematician's experience. Dynamic geometry software, the reflections of the rapid development in computer technology, show promise to achieve these goals (Güven & Karataş, 2003).

A variety of teaching models are used in computer-aided instruction. However, models widely accepted and proposed by Bayraktar, Keser, and Gürol are the following (Usun, 2000: 54); instructional model, hypothetical model, explanatory model, adjusted model. Each of these models in terms of contribution to learning and teaching process reveals the different features of the computer. For example, instructional model is basically based on programmed instruction and computer is used like a patient assistant. In hypothetical model, the student is helped to formulate hypotheses and this model is based on the idea that students should create the information through their experiences. In explanatory model, computer is based on as secret model of student and real life or similar, and student's learning by exploring the subject in progress. In adjusted model, computer is used as a means of reducing the burden of student work and provides opportunities such as computing, data processing and supports him. The common feature of these models is their being that they are an effective assistant in student's learning and getting the student to the center (Usun, 2000: 54). In the light of the information above, the advantages of computer-assisted instruction can be listed in the following way.

- ✓ It provides an appropriate classroom instruction by buying time for the students in their environments. It provides that they enable to check what they learn.
- ✓ Student's immediate learning the accuracy of given answers saves morale.
- ✓ Programs, especially for slow-learning students provide a more positive educational environment. Errors would not be embarrassing since not being in front of other students.
- ✓ Computer-assisted training is effective for students having learning difficulties, from various ethnic groups and with disabilities.
- ✓ The colors, music, and dynamic graphics used in laboratory activities give realism and selectivity to the subject

- ✓ The record keeping skills of computer, make individual learning possible, students' progress can be observed by preparing individual instructions.
- ✓ Computers, provide an increasing data base in accordance with the development of information.
- ✓ Computers can use all the information belonging to text, hearing, and image.
- ✓ A lot of information can be entered for teacher use. Furthermore, the computer gives the individual self-learning experience. In these learning experiences a variety of teaching methods are used.
- ✓ Computer provides reliable and affordable education from one student to another without depending on the teacher and time.
- ✓ Computer-based training increases the effectiveness of teaching. The event is the increase of student's success. Qualification is reaching the goal as soon as possible with less cost. Qualifying is very important in business and industry and its importance in education is increasing.
- ✓ The emergence of systems used easily, has provided opportunities for some trainers to develop their own training programs (DERD, 2002:203-204).

Geometry is a basic and important subject area of school mathematics and conceptually, the basis. In geometry class, students learn characteristic features and the relations among them with geometric shapes and structures. Spatial visualization, thinking of two or three dimensions of a geometric shape in space and looking at various aspects is the most important part of geometric thinking (NTCM, 2000). Expression of dynamic geometry software's, is common name of very special geometry software's developed for geometry such as Cabri Geometry, Geometer's Sketchpad, Cinderella. DGS, entering the education field, has allowed students to hypothesize, explore the theorems and relations, and test them by rescuing the geometry from paper-pen process being static structure and making it dynamic on the computer screen (Güven ve Karataş, 2003). National Council of Teachers of Mathematics (2000) stated that in school mathematics principles and standards, concrete materials, drawings and dynamic geometry software's are necessary to learn geometry. Because, dynamic geometry software's such as Cabri, Geometry Inventor, Cinderalla, Geometer's Sketchpad facilitate student's establishing relationship between geometrical shapes and making inferences.

For mathematic learning and teaching activities, open structured dynamic geometry software's (eg. Sketchpad, Cabri, or Geometric Supposer) are potential powerful tools for students to reconnoiter. By this software, in two-dimensional space, examining the properties of geometrical objects and some relations, and detecting are possible. Cabri, one of this software's, can be used not only for teaching-learning plane geometry but also for other mathematics activities. In addition, not only for BiSa, TI-92 plus advanced He-Ma has Cabri-II software and it is possible to create rich environment for mathematic teaching by using potable personal Technologies (Ersoy ve Baki, 2004).

Researchers have shown that geometry software having dynamic features give the students the opportunity to concentrate on much more abstract structures than widely used paper-pen studies (Hazzan & Goldenberg, 1997, Hölzl, 1996, Choi-Koh 1999). In this way, student's power of imagination increases. In mathematics, increasing of imagination power means opening the way of intuition so the way of creation and discovery. When these roads are opened, the student will be able to analyze, hypothesize, and generalize. This will directly develop student's problem-solving skills (Baki, 2001). DGS, with its features of supporting experience and teaching geometry through research, offers alternative possibilities to geometry taught in the same way for years (Edwards, 1997). With this new approach, students have the opportunity to explore, make assumption, test, reject, formulate, and explain by easily entering into the research environment (Güven ve Karataş, 2003). In geometry teaching, through the use of dynamic geometry software, students can create geometric drawings or do interactive investigations on the dynamic geometric shapes prepared by the teacher (MNE, 2005; MNE, 2006: 24).

Purpose of the study

The main aim of this study is to investigate the effect of learning geometry topics of 7th grade in primary education with dynamic geometer's sketchpad geometry software to student's success and retention. Students' exploring geometry, developing geometric meaning and improving intuition are aimed by using GSP software.

The importance of the study

In primary and secondary school geometry classes, problem is usually solved by giving many rules and features about the subject, the courses are tried to be processed from ragged drawings, and these drawings even confuse the right feelings of the students (Bintaş ve Bağcıvan, 2005). It has been tried to overcome this situation via the math program renewed in 2006-2007 academic year. It is expected that worksheets and GSP drafts used in the study may be as the teachers' use in the classrooms and helpful. In this study, the primary 7th grade geometry subjects were used. The courses were done in the computer laboratory. Before, the students are given the

supporting worksheets prepared by the researcher. The students discovered geometric concepts (line, angle, and triangle) by drawing them, moving the shapes, dragging, changing their features by GSP; and reached the results on their own. At the same time, they will have the opportunity to behave according to the worksheets given, and make assumptions like a mathematician by working on GSP drafts. It is thought that by the help of GSP, moving the geometric shapes they see on the board attracts the students' attention and they have higher-level cognitive skills. The teacher guides the students in this process and directs with questions. A student-centered environment was created.

METHODOLOGY

Research Model

The research model is the experimental model of The Posttest-Only Control Group. The application was carried out by determining two classes on the basis of branches as experimental and control group randomly and objectively. In order to determine whether the level of mathematic knowledge of two groups selected as experimental and control are close to each other, SFBS of 6th grade in 2005 test was administered to the groups before the application. The students in the control group learned the geometry subjects in a traditional way. However, the students in the experimental group learned the same geometry subjects with the worksheets prepared to use with GSP software in the computer laboratory. Both experimental and control group are given the courses by the researcher.

Table 1: Experimental model

Research Groups	Before the Experiment	Experimental Period	After the Experiment	1 Month After the Experiment
Experimental Group (n=21)	SFBS of 6th grades in 2005	Computer Aided Geometry Teaching Used GSP	Geometry Achievement Test	Geometry Achievement Test
Control Group (n=21)	SFBS of 6th grades in 2005	Traditional Method	Geometry Achievement Test	Geometry Achievement Test

Participants

The population of this study is all the 7th grade students studying in the primary schools having computer laboratory in Yıldırım/Bursa. The sample consists of totally 42 students from 7B (Experimental Group) and 7C (Control Group) classes in Şehit Kurmay Binbaşı Ufuk Bülent Yavuz Primary School having computer laboratories in the first term of 2006-2007 academic year. 21 subjects in the experimental and 21 subjects in the control group participated in the study. The distribution of the experimental and control groups of subjects according to gender are given in Table 2.

Table 2: The Distribution of the subjects in experimental and control group according to the gender

Gender	Experimental Group	Control Group	Total
Female	15	13	28
Male	6	8	14
Total	21	21	42

At the beginning of the study, in order to determine whether there is a significant difference between the groups in terms of mathematics achievement SFBS of 6th grades in 2005 was administered to the groups. The results of Mann Whitney U test in SPSS 13.0 (Statistical Package for The Social Science) according to the scores of this test are given in table 3.

Table 3: Mann Whitney U test towards the development of the control and experimental groups

Group	n	Mean	Total	U	p
Experimental Group	21	23,57	495,00	177,00	0,267
Control Group	21	19,43	408,00		

Accordingly, a significant difference was not observed between the groups in terms of mathematics achievement before the application (U=177,0, $p > .05$). When the means analyzed, it is seen that the scores of the groups are close to each other. It is understood from here that groups' levels of knowledge are close to each other.

Gathering Data

In order to collect data for the study the following data collection tools were used: SFBS of 6th grades in 2005 Test, Geometry Achievement Test, Worksheets, Interview form.

SFBS of 6th grades in 2005 Test

This test was administered in order to determine whether there is a significant difference or not between mathematics achievements of the groups generally before the application. There are 25 multiple-choice (four-choice) questions in the test. The test constituted by Test Development Division / Assessment and Evaluation Unit of General Directorate of Educational Technologies / Ministry of National Education in accordance with the developmental stages, by giving place to every cognitive stage and controlling the reliability and validity was taken from the web site www.egitek.MNE.gov.tr on 27.11.2006. Since the entire test developing stages was done by the branch, the researcher did not do anything on the test again.

Geometry Achievement Test

The achievement test developed in this study was used as a post test to measure 7th grade students' geometry achievement after the application and as a retention test to measure their recall levels after a month. Geometry achievement test was prepared according to the target behavior in the unit "Angles and Polygons" of 7th grade. Under the light of these target behaviors, multiple-choice items with three confounding and a correct answer were formed. Two experts examined the draft. After the necessary corrections; a 44-item test of which10 in information stair, 10 in comprehension stair, 14 in application stair, 5 in analysis stair, 3 in synthesis stair, and 2 in evaluation stair was created. This test was administered to totally 370 7th and 8th grade students processing and learning the unit Angles and Polygons in 60 minutes in three primary schools in Bursa. The lowest score the students can take from the achievement test is "0", the highest score is "44". In order to determine the test reliability, item difficulty (P) and item discrimination index (D), 370 students' data were calculated by inputting them to ITEMAN program. Accordingly, the test reliability was determined as (KR-20) 0,911. The average difficulty of the test was calculated as 0,50. While selecting item, first of all, it is given high level of importance to items' having power of discrimination as much as possible and the degree of these items are about 0,50. 6 of these 30 questions are in knowledge, 7 of them are in comprehension, 10 of them are in application, 3 of them are in analysis, 2 of them are in synthesis, and 2 of them are in evaluation level.

Worksheets

Worksheets about Angles and Polygons subject were developed to use with Geometer's Sketchpad. There are open-ended and gap-filling types of questions in worksheets. As general view, there are appropriate pictures and shapes for students' cognitive levels, and attracting their attention. The operations done by Geometer's Sketchpad on the computer were clearly stated with the guidelines. Worksheets are kinds of browser and inquisitive.

Data Analysis

SPSS 13.0 and Iteman program was used to analyze the data. Because the number of the subjects is less than 30, non-parametric statistics were used. The proximity of mathematics achievement levels of experimental and control groups to each other was controlled through Mann-Whitney U test on the basis of the grades from SFBS test. After the application, as a post test, achievement test about angles and polygons unit was administered to the experimental and control groups. Mann-Whitney U test was used to determine whether there was a significant difference between these achievement tests. A month after the application, the retention test was administered to the experimental and control groups. Mann-Whitney U test was used to determine whether there was a significant difference between the groups in terms of retention. Wilcoxon Signed Ranks test was used to calculate whether there was a significant difference between the students' scores from post and retention tests in the experimental group, and between the same scores of students in control group. Mann-Whitney U test was used to determine if the achievement levels (scores of post-test) of experimental and control groups after the application differed significantly from retention levels (scores of retention test) in terms of gender. In the study, the level of significance was 0.05.

FINDINGS

Findings Related to the First Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between mathematics achievement of students in control and experimental groups before the application?" was searched for. The aim of examining this problem was to determine the proximity of the mathematics achievement levels of the experimental and control groups selected randomly to each other before the application, and if the groups are homogeneous or not. SFBS of 6th grades in 2005 test was administered to the groups. The test scores were analyzed by Mann-Whitney U test (Tablo 4).

Table 4: Mann-Whitney U test towards developing the control and experimental groups

Group	n	Mean	Total	U	p
Experimental Group	21	23,57	495,00	177,00	0,267
Control Group	21	19,43	408,00		

Accordingly, there is not a significant difference between the groups in terms of mathematics achievement levels before the application (U=177,00 , p > .05). The scores of the groups are close to each other according to the means. It is understood from here that the groups' levels of knowledge are close to each other.

Findings Related to the Second Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between the geometry achievement test scores of students in control and experimental groups after the application?" was searched for. For this purpose, the geometry achievement test (post-test) results of students in experimental and control groups after the application were analyzed. Mann Whitney U test was used to see whether there was a significant difference between the means of students' post-test in experimental and control groups.

Table 5: The comparison of geometry achievement test scores of students in experimental and control group after the application

Group	n	Mean	Total	U	p	Level of Significance
Experimental Group	21	25,71	540,00	132,00	0,025	p <0,05
Control Group	21	17,29	363,00			The difference is significant

As shown in table 5 above, there is a significant difference between the groups' scores of achievement test prepared about the unit angles and polygons (U=132,00 , p<0,05). When the means are taken into consideration, it is seen that achievement scores of students in experimental group are higher than those in control group. This result shows that students in experimental group learning geometry with GSP dynamic geometry software comprehend better and show higher performance when compared with the students in control group where the traditional method is used.

Findings Related to the Third Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between the retention levels of students in control and experimental groups 1 month after the application?" was searched for. For this purpose, achievement test was administered again as retention test 1 month after the application. Scores gained from the test were examined. Mann-Whitney U test was used to determine if there was a significant difference between retention levels of experimental and control groups or not.

Table 6: The comparison of retention test scores of the students in experimental and control group 1 month after the application

Group	n	Mean	Total	U	p	Level of Significance
Experimental Group	21	25,74	540,00	131,50	0,025	p <0,05
Control Group	21	17,26	362,50			The difference is significant

When table 6 is analyzed, it is observed that the mean of experimental group (25,74) is higher than the mean of control group (17,26). According to the result of Mann-Whitney U test used to investigate whether the difference between the groups was significant, it was found that there was a significant difference between them since the result was p<0,05. In the light of this result, it can be said that computer-aided geometry teaching with GSP dynamic geometry software is effective on students' retention levels.

Findings Related to the Fourth Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between the post test and retention test geometry achievement levels of students in experimental group?" was searched for. For this purpose, the difference between the scores of retention test and post-test of the students in experimental group was examined; and Wilcoxon Signed-Ranks test was used to test the significance of difference between the scores.

Table 7: The comparison of the scores of post-test and retention test of the experimental group

Retention Test- Post Test	n	Mean	Total	z	p	Level of Significance
Negative Sequence	6	8,00	48,00	1,900	0,125	p> 0,05
Positive Sequence	13	10,92	142,00			The difference is not significant
Equal	2	-	-			
Total	21					

When analyzed table 7, there was not a significant difference between the means of post-test and retention test of the students in experimental group (z=1,900; p>0,05). This shows that the control group's academic achievement gained at the end of computer-aided geometry teaching has not changed within a month after the training.

Findings Related to the Fifth Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between the post test and retention test geometry achievement levels of students in control group?" was searched for. For this purpose, the difference between the scores of retention test and post-test of the students in control group was examined; and Wilcoxon Signed-Ranks test was used to test the significance of difference between the scores.

Table 8: The comparison of the scores of post-test and retention test of the control group

Retention Test-Post Test	n	Mean	Total	z	p	Level of Significance
Negative Sequence	6	8,64	60,50	1,402	0,161	p> 0,05
Positive Sequence	13	10,79	129,50			The difference is not significant
Equal	2	-	-			
Total	21					

When analyzed table 8, there was not a significant difference between the groups' scores of post-test and retention test of the students in control group (z=1,402; p>0,05). This shows that the control group's academic achievement gained at the end of traditional geometry teaching has not changed within a month after the training.

Findings Related to the Sixth Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between the geometry achievement levels of the students in experimental group in terms of gender?" was searched for. For this purpose, the scores gained by male and female students in experimental group from achievement test administered as a post-test. It was examined whether there was a significant difference between these scores by using Mann-Whitney U test.

Table 9: The comparison of the scores of post-test, geometry achievement test, in terms of gender in experimental group

The Experimental Group	n	Mean	Total	U	p	Level of Significance
Female	15	11,67	175,00	35,00	0,434	p >0,05
Male	6	9,33	56,00			The difference is not significant

When analyzed table 9, the mean of female students (11,67) is close to the mean of male students (9,33) in experimental group. According to the results of Mann-Whitney U test used to investigate whether there was a significant difference between these scores, it was found that there was not a significant difference between the scores of male and female students gained from the post-test since p>0,05. So, it can be said that computer-aided geometry teaching with Geometer's Sketchpad did not cause a significant difference between the students' achievement levels in terms of gender.

Findings Related to the Seventh Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between the geometry achievement levels of the students in control group in terms of gender?" was searched for. For this purpose, the scores gained by male and female students in experimental group from achievement test administered as a post-test. It was examined whether there was a significant difference between these scores by using Mann-Whitney U test.

Table 10: The comparison of the scores of post-test, geometry achievement test, in terms of gender in control group

The Experimental Group	n	Mean	Total	U	p	Level of Significance
Female	13	12,77	166,00	29,00	0,094	p >0,05
Male	8	8,13	65,00			The difference is not significant

When analyzed table 10, it is obviously observed that the mean of female students (12,77) is higher than the mean of male students (8,13) in control group. According to the results of Mann-Whitney U test used to investigate whether there was a significant difference between these scores, it was found that there was not a significant difference between the scores of male and female students gained from the post-test since p>0,05. So, it can be said that the traditional teaching method did not cause a significant difference between the students' achievement levels in terms of gender.

Findings Related to the Eighth Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between retention levels one month after in experimental group in terms of gender?" was searched for. For this purpose, male and female students', in experimental group, scores gained from retention test administered 1 month after the application were investigated. Mann-Whitney U test was used to see whether there was significant difference between these scores.

Table 11: The comparison of retention test scores in terms of gender in experimental group

Experimental Group	n	Mean	Total	U	p	Level of Significance
Female	15	11,93	179,00	31,00	0,274	p >0,05
Male	6	8,67	52,00			The difference is not significant

When table 11 examined, female students' mean (11,93) is higher than the mean of male students (8,67) in experimental group. According to the results of Mann-Whitney U test used to analyze whether this difference is significant, there is not a significant difference between genders in terms of retention levels since p>0,05. According to this result, it can be said that computer-aided geometry teaching with Geometer's Sketchpad did not cause a significant difference between students' retention levels in terms of gender.

Findings Related to the Ninth Sub-Problem

In this sub-problem, the answer of the question "Is there a significant difference between retention levels one month after in control group in terms of gender?" was searched for. For this purpose, male and female students', in control group, scores gained from retention test administered 1 month after the application were investigated. Mann-Whitney U test was used to see whether there was significant difference between these scores.

Table 12: The comparison of retention test scores in terms of gender in control group

Experimental Group	n	Mean	Total	U	p	Level of Significance
Female	13	11,65	151,50	43,50	0,535	p >0,05
Male	8	9,94	79,50			The difference is not significant

When table 12 examined, female students' mean (11,93) is close to the mean of male students (8,67) in control group. According to the results of Mann-Whitney U test used to analyze whether this difference is significant, there is not a significant difference between genders in terms of retention levels since p>0,05. According to this result, it can be said that the traditional teaching method did not cause a significant difference between students' retention levels in terms of gender.

CONCLUSION, DISCUSSION AND IMPLICATIONS

It was found that, after the application, there was a significant difference between achievement test scores of experimental group learning geometry with GSP dynamic geometry software and control group learning through traditional method in favor of experimental group. This result shows that the students learning geometry with GSP in experimental group have understood better and been more successful when compared with the students of control group traditional method used. In Üstün and Ubuz's (2004) study where the Geometer's Sketchpad was used, there was a significant difference between the groups in terms of post-test achievement in favor of experimental group. In Bahcıvan's (2005) study, although there was an increase in unsuccessful students' scores with CAT, there was not a difference statically. This may be because of using only a projector and a computer within a demonstration in this study. According to the results of achievement test (retention test) administered 1 month after the application again, there is a significant difference between retention levels of the students in experimental and control group in favor of experimental group. In the light of this result, it is seen that computer-aided geometry teaching with GSP dynamic geometry software affected the students' retention levels. The same results were also obtained in Üstün and Ubuz's (2004) experimental study.

Therefore, the traditional method has affected retention, too. Retention of the subjects processing with an educational method is a desired result. When compared experimental and control groups' retention levels to determine which one of the methods is more effective, achievement means of the students in experiment group are higher and more comprehensible than the students' in control group. So that, teaching geometry with GSP dynamic geometry software is more effective than traditional method on retention. There is not a significant difference between geometry achievement and retention levels of students in experimental and control group after the application in terms of gender. This result shows that both traditional method and teaching geometry

with GSP have not created a difference on male and female students' achievement and retention levels. Any significant difference between male and female students was not found in Bintaş and Bağcıvan's (2005) study. In the light of the results of this study, we can state the recommendations developed for math teachers, computer teachers, teacher training institutions, and the ones desiring to study on this subject in following way. Taking into account visual and dynamic features of GSP program, activities and sketches (drafts) can be prepared about the other areas of mathematics except for geometry. The use of dynamic geometry software should be taught to the teachers with appropriate pedagogical principles by pre-service and in-service courses. Otherwise, geometry subjects might not get further from demonstrating as presentation in this program. The students studying in primary and secondary schools and preparing for the exams can use the drafts prepared in this program for the purpose of repetition. The activities took time since the students reach generalizations by struggling, exploring, and building their own knowledge during the application. In these days, when constructivist approach was adopted, the number of mathematics lessons should be increased for a more effective geometry teaching in primary schools. The use of dynamic geometry software such as GSP should be supported and improved in primary, secondary, and higher education. In the universities training teachers, the number of computer lessons should be increased and the lessons about the effective use of dynamic geometry software in teaching geometry for math teachers should be added to the curriculum. The teachers should use the computer well in order to use this program. So, this lack of teachers' information should be eliminated first. It can be said that the lesson in universities and Ministry of Education courses are important. In addition, in transformation geometry having an important part in new primary school curriculum and fractal geometry talked about sometimes, GSP can be used easily, creative activities can be prepared and students can produce original outcomes. For this reason, the teachers should prepare classroom environments where GSP is used, and the students can be creative. In order to administer computer-aided geometry teaching successfully, fully equipped computer laboratories having sufficient number of computers, and where the students can study comfortably should be set up. Because it is important for students, closely engaging in computer in dynamic geometry environments, to enter into social interaction; they should be allowed to make group discussions and teacher guided class discussions.

Abbrevitions

BDÖ: Computer Assisted Teaching **DGY**: Dynamic Geometry Software **GSP**: Geometer's Sketchpad

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