The impact of the ein supported math education on students’ achievement and opinions in 5th grade geometry teaching

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The aim of this study is to observe the effect of Education and Informatics Net (EIN) supported math teaching on students’ success in geometry teaching 5th grade level and to observe students’ comments on EIN. This study was conducted in the 2nd term of 2018-2019 school year. Both qualitative and quantitative research methods were implemented. Pre-test and post-test controlled group quasi-experimental design was used in the research’s quantitative part. While 5th grade geometry subjects were taught via course books and concrete materials to one group, the other group was exposed to EIN supported math teaching methods. The research sample is limited, comprising Giresun city, 34 secondary school students, of whom 17 each were for the experimental and control group. An achievement test consists of 25 questions was developed by the researcher and its validity and reliability were checked by experts in the field. The achievement test was implemented through both groups as pre-test, post-test and permanency test after 8 weeks. The collected data was administered through SPSS 24.0 package program. Paired t-test and unpaired t-test were used to analyze the collected data. Students were asked to answer the beforehand prepared feedback form that consists of questions about the use of EIN in the qualitative part of the research. When the quantitative data results are analyzed, both of the groups had succeeded in learning 5th grade geometry subjects. However, it is seen that experimental group students are more successful than the ones in control group. Permanent learning happened in both of the groups. In addition, it is clear that students have positive attitudes towards EIN according to qualitative data results.

Key words: Educational Informatics Network (EBA), 5th grade geometry teaching, geometry.

INTRODUCTION

Recently, in addition to the rapid developments in science and technology, educational programs have been constantly renewed and have undergone new changes in order to carry out contemporary teaching models. These innovations in educational programs aim to make the students more active in teaching environments. While

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technology is taking place in all areas of our lives, it has become inevitable in the field of education as well. Considering that learning knowledge by hearing does not maket it permanent knowledge for students, Mathematics education is supported by technology, visualizing knowledge during learning process and having students try to access it by themselves makes a more permanent learning for them.

Like all other parts of the World, in our country beside the new instructional approaches, the power of technology is utilized in order to solve the problems faced in education "With the rapid development and change in technology and science, in many areas such as economy, culture, politics and education, the expectations vary according to the society we live in. In the light of these developments, especially in the world of education, severe differences have been experienced, important information about how individuals learn has been reached, and various new approaches have been developed to respond to the needs of the society" (Doruk, 2010). In this context, the purpose of education is "to train people who are constantly learning, who can apply the knowledge they have learned, who can think critically and have problem solving skills, who can produce new ideas, find solutions, and who are not unfamiliar with innovations" (Olkun and Toluk, 2003). In terms of mathematics education, it is expected from mathematics educators to raise individuals who are able to produce effective solutions in real problematic situations, associate the mathematical knowledge they’ve learnt with their daily life, who are aware that the mathematics and the world they live in are a whole, and consequently, who love mathematics and are not afraid of it (Çiltaş and Yılmaz, 2013). “Mathematics emerged parallel with the needs of society -with counting and measuring, and today it, especially with its frequent use in technology, has gained an important place among other sciences” (Çiltaş, 2011). According to Altun (2008), the aim of mathematics teaching is to “provide a person with the mathematical knowledge and skills required by daily life, teach him/her how to solve problems and make him/her acquire a way of thinking that handles events in a problem-solving approach”.

Learner-oriented educational activities have an important place in modern learning approaches. In Turkey, Educational Informatics Network (EBA) developed by the Ministry of Education, provides significant benefits to educators and students in this regard (Bolat, 2016). Educational Informatics Network (EIN) is defined as “an online social education platform offered to individuals -free of charge, by the General Directorate of Innovation and Educational Technologies (EIN, 2016). Today, EIN, which includes many services for education, is highly used by primary and secondary school students. EIN started to broadcast in 2012, became enriched by being renewed for changing needs and became the world’s largest content service. It seems that “the EIN system was used by 10 million primary and secondary school students in the academic year of 2015-2016. The EIN is a system that includes educational contents in addition to educational tools that teachers and students can use. Including resources in video formats, in addition to resources with audio, text and picture formats, EIN is a system that supplies users with facilities such as uploading files, cloud storage, organizing competitions, lectures suitable for various levels, making announcements and doing other kinds of sharings by users. These possibilities are only some of the features that enrich the EIN system (Aktay and Keskin, 2016).

The previous research shows that EIN has positive effect on learning math, students who were taught using had higher level of learnings (Artun et al., 2018) also the students were more successful in various subjects (Hastürk and Balliell, 2018), and it facilitated learning proving to be a more efficacious way of teaching. Lastly, the research provided evidence that it increased spatial ability in terms of math teaching (Özlü, 2014).

E-contents in the EIN should address to different learning styles. One of these is visual ability. Spatial ability is linked to many areas related to daily life. High level visual ability is also associated with formations and productivity in art, science and mathematics. Famous physicists (Albert Einstein, Newton) who succeed new inventions (Richard Stallman and Linus Torvalds) and scientists (Aziz Sancar, Feynman, Pascal) have also succeeded with their advanced spatial abilities, and stated that this ability was an important factor in their most impressive formations. Although there are contradictory situations in the studies regarding to what extent spatial ability can be improved and developed, many studies have shown that spatial ability can be developed through education when the appropriate environment and materials are given” (Olkun, 2003: 40). It is stated that the activities in the curriculum are not sufficient to improve spatial abilities as a result of the studies conducted in our country (Kayhan, 2005; Türğüt, 2007; Kakmacı, 2009). For this reason, there is a need for new scientific products to improve spatial abilities. Türğüt (2007) reached the conclusion that the level of spatial skills is not high in his study on students at the second level of primary education. For this reason, students need different learning approaches for their developmental situations, activities and acquisitions appropriate to the contents. It is believed that EIN supported math teachings would be more effective and efficacious as it has been proven to support learning and increase spatial ability of students. Because it provides more opportunities for learning.

**Problem**

The main problem of this study is “In 5th grade Geometry Teaching, does the teaching by using the Educational
The sub-problems

1. Is there a statistically significant difference between the pretest scores of the experimental and control groups?
2. Is there a statistically significant difference between the post-test scores of the experimental and control groups?
3. Is there a statistically significant difference between the pretest and post-test scores of the experimental group?
4. Is there a statistically significant difference between the pretest and post-test scores of the control group?
5. What are the opinions of the students of the experimental group, who do the EIN-supported practices for the geometry subjects in the 5th grade, about the EIN activities, geometry teaching, and practices?

METHODOLOGY

In this study, quantitative and qualitative research methods were used together. Therefore, the research method is a mixed research method. Creswell (2008) defines the mixed research method as a procedure for collecting and analyzing qualitative and quantitative data in a mixed way at the stages of the relevant research process in order to fully understand a research problem. Creswell (2017) determined three basic mixed-method patterns in mixed research methods in accordance with the purpose. In this research, an explanatory sequential pattern from these designs was used. In explanatory sequential research studies, quantitative data are collected first, and qualitative data are collected and analyzed in order to examine the results obtained from quantitative data in depth (Mc Millan and Schumacher, 2010). In this study, first, quantitative data were collected in order to determine the learning levels of 5th-grade students about geometry subjects, and then the results obtained in the light of the collected qualitative data were examined in depth.

The research was conducted by choosing one of the two equal branches as the experimental group and the other as the control group. During the research process, applications were conducted before and after the research in both groups. The research design is shown in Table 1. After the application, interviews were made with the students in the experimental group using the interview form prepared. An interview is defined as communicating with people for specific purposes. The main purpose of the interview is to reveal the feelings, thoughts, and beliefs of the individual interviewed about the subject being studied (Çepni, 2010: 51). For this reason, interviews were conducted to learn the thoughts of the students about the EIN-supported Geometry Teaching after the application.

Participants

Necessary legal permissions for the research were obtained from the Giresun Provincial Directorate of National Education. The universe of this research consisted of 2nd-level primary education students in Giresun. The sample of the study consisted of 6-H and 6-E classes in the 15 Temmuz Imam Hatiq Intermediate School in the Central district of the province of Giresun in the second semester of the 2018-2019 academic year. In the sample, there were 34 students in total, 17 students in 5-E class that made up the experimental group, and 17 students in 5-F class that made up the control group. The distribution of the students by gender in the experimental and control groups is given in Table 2.

Data collection tools

The following data collection tools were used to collect data in this study.

1. Mathematical achievement test
2. Semi-structured interview form

Mathematical achievement test

In order to measure the success of the participating students concerning the geometry subjects, an achievement test included geometry subjects was created. Since the mathematical achievement test was going to be held in a class time duration (40 min), it was decided to be consisted of 25 test questions. Therefore, a test of 40 questions, consisted of questions applied in the Scholarship

Table 1. Experimental design of the study.

| Groups           | Preliminary measurements | Applications                  | Final measurements                     |
|------------------|--------------------------|-------------------------------|---------------------------------------|
| Experimental group | Mathematical achievement test (Pretest) | Activities for EIN           | Mathematical achievement test (Post-test) |
| Control group    | Mathematical achievement test (Pretest) | Applications for the MoNE program | Semi-structured interview form         |

Table 2. Distribution of students in the experimental and control groups by gender.

| Gender       | Experimental Group (Learning according to EIN-supported approach) | Control group (Traditional learning) | Total |
|--------------|-------------------------------------------------------------------|-------------------------------------|-------|
| Female       | 8                                                                 | 7                                   | 15    |
| Male         | 9                                                                 | 10                                  | 19    |
| Total        | 17                                                                | 17                                  | 34    |

Informatics Network (EIN) system and traditional methods have an effect on the academic success of students?"
Examinations by the Ministry of National Education (MoNE) in the previous years and in the 5th grade acquisition comprehension tests recently broadcasted on the official website of the MoNE, was created. In order to ensure the content validity of the mathematical achievement test, the opinions of 1 expert in the field of mathematics education and 4 mathematics teachers were taken. The pilot application of the achievement test was carried out with a total of 100 students who had been taught the geometry subjects in the previous year. The answers given by each student to the questions were recorded one by one, and the discrimination powers (d) of the questions were calculated. The distribution of the discrimination power of the items in the test is shown in Table 1.

### The semi-structured interview form

In the research, after the application, a Semi-Structured Interview Form was prepared in order to find out the students' opinions about the EIN-supported Teaching Activities. Before preparing the interview form in the research, the documents used in the studies on EIN-supported education were examined. As a result of the examination, a draft interview form was prepared from the documents obtained using the observations of the researcher during the application, secondary school mathematics textbooks, and the mistakes made by the students during the application. This interview form was then discussed with three academicians who were experts in their fields and two math teachers. Before the semi-structured interview form was applied to the students in the experimental group, a pilot study was conducted with 3 students, who were not members of the experimental group, on the clarity and comprehensibility of the interview items and the adequacy of the 15-20 min time allocated for the interview. The final version of the interview form was created by eliminating the identified deficiencies in all the interviews and making the necessary arrangements. In the interview form, questions about the place of the EIN approach and other approaches in the current mathematics curriculum, the applicability of the in-class activities and the approaches offered by the program, and the students' opinions about the EIN-supported teaching were included.

### Application process

The following procedures were applied respectively to both the experimental and control groups in the study.

1. Academic achievement tests and semi-structured interview form, which were the data collection tools of the research, were prepared.  
2. For the application, a permit application was made to the Giresun Directorate of National Education through Giresun University Institute of Educational Sciences, and necessary permissions were obtained.  
3. The experimental and control groups of the students studying in the 5th-grade branches in the school where the application would be held were determined by the neutral assignment method.  
4. Before starting the application, teaching materials were prepared in accordance with the objectives and target behaviors of the geometry course.  
5. Before starting the application, monthly course hours were determined in the experimental and control groups, and the total course hours recommended by the Ministry of Education were followed.  
6. The mathematical achievement test was applied as a pretest to the experimental and control groups.  
7. Teaching techniques suitable for the EIN-supported teaching techniques were used in the experimental groups. In the control groups, traditional teaching methods, i.e. lecturing and question-answer techniques were used.

8. All subjects were taught to the experimental and control groups by the researcher.  
9. After the application, the academic achievement test was applied to both groups as a post-test.  
10. All quantitative data obtained were analyzed.  
11. After the application, interviews were made with randomly selected students in the experimental group. The qualitative data obtained were analyzed.

### Data analysis

The analysis of the results obtained in the research was made as follows:

#### Analysis of quantitative data

SPSS package program was used to analyze the data. All the data obtained were entered into the program, and necessary measurements were made. To determine whether there was a significant difference in the comparison of pre-test, post-test, and retention test results of the experimental group and the control group, *t-Test for Independent Groups* was used. To determine whether there was a significant difference in the comparison of the pre-test and post-test results of the experimental group and the control group and the post-test retention test results, *t-Test for Dependent Groups* was used.

#### Analysis of quantitative data

The content analysis method was used to analyze the students' views about teaching according to the EIN-supported teaching. Büyüköztürk et al. (2008) describe content analysis as a systematic, renewable technique in which some words of a text are summarized with smaller content categories through coding based on certain rules. In the content analysis, the collected data are firstly listed, then the themes are determined, and finally, the themes are organized (Yıldırım and Şimşek, 2011).

### RESULTS

This study used a mixed method research design that included quantitative and qualitative analysis that lead discussion as show in Figure 1.

### Results regarding the first sub-problem

Since the number of observations in the experimental group was 17 in the normality test performed with the data related to the first sub-problem, the Shapiro-Wilk analysis was performed, and it was found that the p-value indicated by the significance level was 0.508. Since the number of observations in the control group was 17 in the normality test performed with the data related to the first sub-problem, the Shapiro-Wilk analysis was performed again, and it was observed that the p-value indicated by the significance level was 0.145. The results of the t-test for independent groups are shown in the Table 4. Effect sizes are shown in table 3.

In the t-test conducted to determine whether there was a significant difference between the pretest results of the
Table 3. Distribution of items according to discrimination power for mathematical achievement test.

| Discrimination power | Number of Items | Percentage | Evaluation     |
|----------------------|-----------------|------------|----------------|
| d > 0.40             | 6               | 24         | Very good      |
| 0.30 > d > 0.39      | 8               | 32         | Fairly good    |
| 0.20 > d > 0.29      | 11              | 44         | Need to be corrected |

Table 4. Test results regarding the pretest results of the groups.

| Groups      | N   | $\bar{X}$ | S       | sd   | t    | p     | Effect (d) |
|-------------|-----|-----------|---------|------|------|-------|------------|
| Experimental| 17  | 9.59      | 2.526   | 32   | 0.410| 0.684*| 0.21       |
| Control     | 17  | 9.88      | 1.536   |      |      |       |            |

*p<0.05 significant.

Table 5. Test results regarding the post-test scores of the groups.

| Groups      | N   | $\bar{X}$ | S       | sd   | t    | p     | Effect (d) |
|-------------|-----|-----------|---------|------|------|-------|------------|
| Experimental| 17  | 12.76     | 4.085   | 32   | 1.355| 0.022*| 0.55       |
| Control     | 17  | 11.18     | 2.58    |      |      |       |            |

*p<0.05 significant.

experimental group students and the control group students, no significant difference was observed between the average test score of the students in the experimental group ($\bar{X}_{\text{experimental}} = 9.59$) and the average test score of the students in the control group ($\bar{X}_{\text{control}} = 9.88$), $[t_{(35)} = 0.410, p>0.05]$. In this case, it can be said that the students in the experimental and control groups before the application were at the same level.

Results regarding the second sub-problem

The second sub-problem of the study asked "Is there a statistically significant difference between the pre-test and post-test scores of the experimental group?" Since the number of observations was 17 in the normality test performed with the data related to the second sub-problem, the Shapiro-Wilk analysis was performed, and it was found that the p-value indicated by the significance level was 0.08. According to Can (2017: 89), the fact that the p value is greater than 0.05 (accepting the absence hypothesis as "there is no difference with the normal distribution") means that normality is achieved. The result of the normality test shows that the t-test can be performed for related samples, which is a parametric test. The results of the t-test for independent groups are shown in Table 5.

In the t-test conducted to determine whether there was a significant difference between the post-test results of the experimental group students and the control group students, a significant difference was observed between the average test score of the students in the experimental group ($\bar{X}_{\text{experimental}} = 12.76$) and the average test score of the students in the control group ($\bar{X}_{\text{control}} = 11.18$), $[t_{(35)} = 1.355, p<0.05]$. When the test averages of the groups are examined, it is seen that the students in the experimental group to whom the EIN method was applied were more successful in 5th-grade geometric subjects than the students in the control group who were taught with the traditional method. The effect size of this
success \( d = t \frac{\sqrt{\frac{N1+N2}{N1.N2}}} \) was calculated as 0.55. This shows that the difference in achievement between the students in the experimental group and the students in the control group is medium. This finding is in line with previous findings indicating the EIN supported teaching increases the students' learnings (Balliel, 2018).

### Results regarding the third sub-problem

Since the number of observations in the normality test conducted with the third sub-problem was 17, the Shapiro-Wilk analysis was performed, and it was found that the p-value indicated by the significance level was 0.08. The results of the \( t \)-test for dependent groups are shown in the Table 6. As a result of the \( t \)-test for dependent groups conducted to determine whether there was a significant difference between the pretest and post-test scores applied to the students in the experimental group, a significant difference was observed between the average pretest score \( \bar{X} = 9.59 \) and the average post-test score \( \bar{X} = 11.18 \) \( t(15) = -3.928 \), \( p<0.05 \). The effect size calculated according to the test result \( d = 1.71 \) shows that this difference is at a high level. In this case, it can be interpreted that teaching with traditional methods applied in the aforementioned group had a significant effect on students' test success. This finding is in line with previous findings indicating the EIN supported teaching increases the students' learnings (Hastürk and Balliel, 2018).

### Results regarding the fifth sub-problem

The fifth sub-problem of the research is consist of the experimental group students' opinions, in the 5th grade classrooms in which the EIN-supported applications on geometry subjects done, on the use of EIN, its contents, its dissemination, the adequacy of the contents and the EIN supported lectures. After the activities carried out with the students in the experimental group with the method supported by EIN, the students' opinions were taken by applying the semi-structured interview form in Annex developed by the researcher. Students' opinions taken with open-ended questions were examined and evaluated separately. These questions and the answers given by the students to these questions are shown below in tables.

**Question 1:** What are your opinions on the ease of use of the EIN platform?

### Table 6. Test results regarding the experimental group's pretest and post-test scores.

| Measurement | N  | \( \bar{X} \) | S   | sd  | t   | p      | Effect (d) |
|-------------|----|-------------|-----|-----|-----|--------|------------|
| Pretest     | 17 | 9.59        | 2.526| 16  | -7.374| 0.000*  | 4.15       |
| Post-test   | 17 | 12.76       | 4.085| 16  | -3.928| 0.000*  | 1.71       |

*p<0.05 significant.

### Table 7. T-Test results for dependent groups regarding the control group's pretest and post-Test Scores.

| Measurement | N  | \( \bar{X} \) | S   | sd  | t   | p      | Effect (d) |
|-------------|----|-------------|-----|-----|-----|--------|------------|
| Pretest     | 17 | 9.88        | 1.536| 16  | -3.928| 0.000*  | 1.71       |
| Post-test   | 17 | 11.18       | 5.253| 16  | -3.928| 0.000*  | 1.71       |

*p<0.05 significant.
The responses given by the participants to Question 1 are presented in Table 8. When Table 8 is examined, the views of most students using the EIN about the EIN are that it is comfortable and easy to use. On the other hand, 25% of the students stated that they had difficulty with signing in the EIN, and some were asked to submit their identity card Vol number. Some students complained that the videos freeze while watching.

Some of the participants' views about the EIN are as follow:
P3: I think the EIN is the best application made for students. Students have fun and they learn. What else could anyone ask for?

Question 2: What do you think about using EBA contents while learning a subject makes it easier for you to understand the subject or not? Why?
The responses given by the participants to Question 2 are presented in Table 9. When Table 10 is examined, it can be seen that the use of the EIN in forming the acquisitions facilitates most of the students learning. It was stated that the lecture videos, tests and educational games in the EIN facilitate comprehending the subjects better and it is a good tool to revise the subject. Some of the participants’ views on this question are as follows:
P4: Since I understand my subjects, I sign in the EIN a little. That's why it does not make it very easy. I usually use it when the teachers give homework.

Question 3: What are your views on disseminating the classes to be given by using the EIN contents?
(a) It should be disseminated because...
(b) It shouldn't be disseminated because...

The responses given by the participants to Question 3 are presented in Table 10. When Table 11 is examined, it is seen that some of the students stated that the courses made using EBA contents should be generalized and some stated that it
Table 10. The responses given by the participants to Question 3.

| Participants | Views                                |
|--------------|--------------------------------------|
| P1           | Useful                               |
| P2           | Enjoyable, entertaining               |
| P3           | Make the subject revisable            |
| P4           | Easy, understandable                 |
| P5           | Fast accessibility                    |
| P6           | Visually interesting                  |
| P7           | Different ways of lecturing           |
| P8           | Using the time more efficiently       |
| P9           | Memorable                             |
| P10          | Videos of lectures are inadequate     |
| P11          | Make it difficult to learn during the classes. |
| P12          | Lectures are too bad                  |

Table 11. The responses to the option a of the question 4 in the interview form.

| Participants | Views            |
|--------------|------------------|
| P1           | Yes, sufficient  |
| P2           | Yes, sufficient  |
| P3           | Yes, sufficient  |
| P4           | Yes, sufficient  |
| P5           | Yes, sufficient  |
| P6           | Yes, sufficient  |
| P7           | Yes, sufficient  |
| P8           | Yes, sufficient  |
| P9           | Yes, sufficient  |
| P10          | No, not sufficient |
| P11          | No, not sufficient |
| P12          | No, not sufficient |

was unnecessary. Some of the participants' views on this question are as follows:
P6: It should not be disseminated because some children may enter unsuitable websites lying that they are studying at the EIN.
P5: It should be disseminated. There should be more lecture videos and the topics should be lectured in more details as our teachers lecture. So we can solve test questions better.

Question 4: Do you think the knowledge on the EIN related to this subject is sufficient? The responses given by the participants to Question 4 are presented in Tables 11 and 12.

When the tables are examined, it is seen that the students do not have a weighted opinion about the content of lecturing on the EIN supported geometry teaching. It can be declared that the exercises part in the EIN is found insufficient by most of the students. Some of the students' responses to this question are as follows:
P6: Lecture is enough because there are 8-10 videos on a topic. The number of exercises need to be increased and the examples should not be that simple.

Question 5: If this subject was lectured without the EIN contents, what would be the difference between the two types of learning approaches? Explain. The responses given by the participants to Question 5 are presented in Table 13. When Table 13 is examined, it is seen that subject teaching by the EIN supported approach is beneficial for students. Some of the students stated that they learn the subject faster thanks to the EIN; if the EIN was not in use, it would take longer to learn the subject and they would not be able to complete the subject deficiencies. However, some of them stated that lectures by their own teachers are better and the EIN is
Table 12. The responses to the option b of the question 4 in the interview form.

| Participants | Views          |
|--------------|---------------|
| P₁           | Yes, sufficient |
| P₂           | No, not sufficient |
| P₃           | No, not sufficient |
| P₄           | No, not sufficient |
| P₅           | Yes, sufficient |
| P₆           | No, not sufficient |
| P₇           | Yes, sufficient |
| P₈           | No, not sufficient |
| P₉           | Yes, sufficient |
| P₁₀          | No, not sufficient |
| P₁₁          | No, not sufficient |
| P₁₂          | No, not sufficient |

Table 13. The responses to the question 5 in the interview form.

| Participants | Views                                             |
|--------------|--------------------------------------------------|
| P₁           | I would not be able to learn the subject quickly |
| P₂           | It would be difficult to remember it              |
| P₃           | It would take long to learn it                    |
| P₄           | With the videos the subject is permanent on my mind |
| P₅           | I would not remember the subject quickly while revising it |
| P₆           | I would not be able to complete the subject deficiency |
| P₇           | There wouldn’t be any difference                  |
| P₈           | It would take long to learn it                    |
| P₉           | I would not be able to learn the subject quickly  |
| P₁₀          | I would not be able to complete the subject deficiency |
| P₁₁          | I would not be able to complete the subject deficiency |
| P₁₂          | There would not be any difference                 |

not needed. Some of the students' responses to this question are as follows:
K3: Yes, there would be a difference. We would spend more time to learn the subjects, and we would have less time remain for other lessons.
As a result of the interviews, when the answers given by the students to the interview questions are examined in general, it can be said that all students find the EBA-supported method useful and they think that using this method in all lessons can improve themselves positively. Students generally stated that they had the opportunity to learn abstract concepts much better by having fun and exploring with the EBA-supported method. They also stated that this and similar methods should be used in other subjects and other lessons and that these methods should be generalized in a way that everyone can benefit from.
In this study, the effect of EBA-supported teaching on students' academic achievement in teaching 5th grade Geometry subjects was examined.

**DISCUSSION**
In the research, correspondingly to what is aimed, the mathematical achievement test was applied to both groups as a pre-test in order to determine the prior knowledge of the experimental and control groups about the geometric objects. According to the analysis results, it was concluded that there was no statistically significant difference between the prior knowledge of geometry subjects of both groups. This result shows that the experimental and control groups in which the research was conducted are homogeneous, in other words they are identical.
In the research, geometry subjects were taught to both groups, and the mathematical achievement test was applied to both groups as a post-test after the teaching activity. According to the results of the analysis, it was determined that the average test scores of the experimental group in which the teaching was carried out by using the EBA-supported method, increased more
than the test score average of the control group where
the teaching was carried out using the traditional method.
Moreover, in the results of the analysis, it was determined
that there was a statistically significant difference
between the post-test average scores of both groups.
Since the difference between the scores of the
experimental group students is greater than the
difference between the scores of the control group
students, it can be concluded that the EBA supported
method is more effective in teaching geometry subjects.

In the research, the mathematical achievement test
was applied as a retention test to both groups 8 weeks
after the application. According to the results of the
analysis, no statistically significant difference was found
between the post-test scores and the retention test
scores of the experimental group students. This situation
shows that the knowledge of the students in the
experimental group about geometry, which they have
learned by discovering themselves, is permanent. A
statistically significant difference was found between
the post-test scores of the control group students and their
retention test scores. In this case, it can be said that the
control group students' knowledge about geometry, which
they learned with traditional teaching methods, is not
permanent.

The results are in line with previous research.
Considering the literature, in the study of Hastürk and
Balliel (2018), it was concluded that the students were
more successful in the experimental group where the
subjects were handled using the contents on the EIN.
Artun et al. (2018) determined that the teaching using the
EIN contents has a positive effect on students' learning.
In their study, Eryılmaz and Salman (2014) found that
using e-content during teaching subjects facilitates and
quickens learning subjects. Turgut (2010) and Özlü
(2014) concluded that teaching supported by technology
improves spatial abilities of students.

As a result of the evaluation of the students data in the
interview form, the students stated that it is not difficult to
use EBA and that they do not have trouble when using
the EIN. However, they said that they had problems while
signing into the EIN system. The students expressed
their views that during the teaching phase of the subject,
the exercises in the EIN contents were useful to them
that they used them to revise the topics, and the visibility
of the contents was adequate. Moreover, it was
determined that the students demanded the EIN-
supported contents to be applied more in the classes.
Some of the students thought that the exercises section
in the EIN was insufficient, while others stated that the
subjects section was insufficient. It was concluded that
some of the students stated that they learned more easily
with the EIN-supported teaching when some stated that it
was useful to reinforce the subjects, the knowledge was
more permanent because they were appealed to
visually, and the time they need for learning was shorter.

In the study by Tüysüz and Çümen (2016), students
stated that it was beneficial to use the EIN to reinforce
the subject, revise the subjects and prepare for the
exams, and they were attracted with the contents.
Additionally, they found that the students had occasional
problems while signing into the EIN system and that it
took time to upload videos or cause some freezing
problems with videos. Timur et al. (2017), in their study
on the EIN, researched the views of middle school
students and concluded that most of the students use the
EIN for revising the subjects and find the EIN system
useful. Bertiz (2017), as well, in his study, concluded
that students stated they could easily use the EIN and it
was visually interesting to them. However, contrary to
other studies, they stated that the system was not slow.
In summary we can say that EIN supported teaching is
more effective than general way of teaching, as it provides
more opportunities for learning and interaction. In
addition to it, the students indicated it made the topic
easier and it is more enjoyable to attend the classes.

Suggestions

The author suggests that the insufficiency of infrastructure
and equipments in schools negatively effects the active
use of the EIN in the classroom. For this reason, this
problem in schools can be solved by eliminating internet
connection problems. At the beginning of the semesters,
brochures about the use of the EIN can be prepared and
students can be informed about the EIN contents and
applications. Also, the use of the EIN courses can be
organized in the computer classes of the school or in
public education centers for students who have difficulties
while using the EIN. By giving information about the EIN
to teacher candidates in Education Faculties at
universities, they can be provided with subjectson
increasing skills in developing e-contents and using
 technological tools. The EIN-related activities can be
 added to school books to makemore proactive use of the
EIN. In addition to the EIN, similar applications such as
geogebra and dynamic geometry software can be used to
increase the impact of the EIN-supported geometry
 teaching. EBA-supported education can also be
conducted at primary schooland secondary school level
students. Comparisons can be made by applying similar
studies in schools that accept students with or without an
entry examination.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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