Journal of Gifted Education and Creativity
10(4), 345-361, December 2023
e-ISSN: 2149- 1410
jgedc.org dergipark.org.tr/jgedc

Genc Bilge Publishing Ltd.
(Young Wise) © 2023
gencbilgeyayincilik.com

Research Article

Scenario-based teaching in teaching algebra in gifted education[1]

Esra Altıntaş[2]* Şükrü İlgün[3] and Ceren Ercan[4]

Adnan Menderes University, Faculty of Education, Math Education Department, Aydın, Turkiye.

Article Info

Received: 27 November 2023
Accepted: 28 December 2023
Online: 30 December 2023

Keywords
Algebra
Scenario-based learning
Skill-based questions
Gifted student

Abstract

The purpose of this research is to investigate the effect of the scenario-based learning method in 6th and 7th grade Algebra teaching on the success of gifted and nongifted students in skill-based questions and their opinions about teaching. It is thought that learning with scenarios in the field of algebra will increase students' self-confidence in mathematics lessons and will help break down the prejudice they may have against skill-based questions. This research was conducted with seven gifted students and 58 non-gifted students. The model of the research is a mixed method in which qualitative and quantitative data are used together. According to the findings obtained from the research, there was a significant difference in favor of the posttest of the experimental group nongifted students in the course taught with the scenario-based learning method in algebra teaching, there was no significant difference in the pretest and posttest results in the control group taught by applying current teaching methods, and the results of the experimental and control groups were significantly different. It was observed that the posttest averages differed significantly in favor of the experimental group, while there was an increase in the total scores and achievement-based scores of gifted students in favor of the posttest. When the opinions of the experimental group students were examined, it was revealed that they were more effective in the lessons taught using scenario-based learning methods, they achieved permanent learning, their anxiety decreased compared to the current teaching, and they stated that they had fun.

To cite this article:
Altıntaş, E., İlgün, Ş & Ercan,C. (2023). Scenario-based teaching in teaching algebra in gifted education. *Journal of Gifted Education and Creativity, 10*(4), 345-361.

Introduction

The education system aims to raise people with integrated knowledge, skills and behaviours. The individual is expected to know his own learning needs, be aware of the learning process, be able to use previous learning in daily life and continue his development throughout life. Mathematics education has a long history and importance. Maths takes old information into consideration, justifies it with new information, and makes use of verified knowledge and skills (Moralı, Uğurel, Türnüklü, & Yeşildere, 2006). The frequent presence of algebra in the world of mathematics reveals the importance of individuals learning algebra (Williams & Molina, 1998). Algebra; It is a unit in a language and mathematics course (Dede and Argün, 2003). Algebra learning area first appears in the 6th grade of secondary school. This area of learning continues in the 7th grade, and algebra is given more attention in the 8th grade, which is the last stage of secondary school (MoNE, 2017).

1 This article was produced from Ceren Ercan's master's thesis, supported by Kars Kafkas University BAP Unit within the scope of project no. 2023-SB-22.
2 Corresponding Author: Assoc.Prof, Adnan Menderes University, Faculty of Education, Math Education Department, Aydın, Turkiye. E-mail: altintas.esra1982@gmail.com. ORCID: 0000-0003- 3311-7179
3 Assoc.Prof., Kafkas University, Faculty of Education, Math Education Department, Kars, Turkiye. E-mail: mat.ilgun@hotmail.com. ORCID: 0000-0002- 2842-2032
4 Student, Department of Math Education, Faculty of Education, Kafkas University, Kars, Turkiye. E-mail:cerenercan35@gmail.com. ORCID: 0000-0002-8595-131X

In order to develop mathematical disposition in students, well-planned teaching content should be provided, positive beliefs about problem solving should be created in students and their abilities should be developed accordingly (Altun, 2006, p. 226). In order to increase the quality of mathematics teaching and to provide a fun and effective learning environment, different learning methods are needed, unlike conventional learning methods. The modern understanding of education directs individuals towards "learning to learn" activities rather than giving information directly to individuals (Geçer and Özel, 2012). The movement of education and training away from traditional understanding and towards contemporary understanding ensures that students learn the rules and concepts of mathematics teaching in a more permanent way, more useful in daily life, and in a meaningful way, as opposed to a rote memorization approach. The methods and techniques in the contemporary education system, where student-centered practices exist, should also be used in mathematics teaching where students have difficulty. Scenario-based learning is one of the methods that aims to increase the permanence and quality of teaching, but also where the student feels more effective and finds fun in this process.

With the scenario-based learning approach, the individual transforms thought into behaviour and makes learning concrete. Scenario-based learning guides students through a scenario and enables them to make their own decisions about situations and problems. It has been observed that students express their thoughts more easily and their participation in the course increases in courses taught with a scenario -based learning approach (Süğümlü, 2009). The most important reason for this is the opportunities given to students in the chain of scenarios created by events that are associated with daily life and can be experienced through scenarios. Scenario-based learning should be used in algebra acquisitions that students have difficulty in making sense of due to its abstract structure and unique language, which they encounter at all levels of secondary school.

The scenario-based learning method will be effective on nongifted students, as well as gifted students who are studying at the Science and Art Center. Because gifted students have the potential to improve themselves and change the perspective of society. These individuals have common characteristics such as the ability to produce different solutions to problems, their sensitivity to many areas of interest, their strong memory, their high ability to focus, their rich vocabulary, their ability to distinguish similarities and differences, and their ability to establish connections between situations (Çağlar, 2004). For this reason, considering the creativity and problem-solving skills of gifted students, the effect of the scenario-based learning method in teaching algebra on gifted students as well as nongifted students, emerges as a problem situation.

Along with the education system, measurement and evaluation methods have also changed, and skill-based questions have gained importance with the High School Entrance Examination (HSEE). It is known that more than one question arises from the field of algebra learning in HSEE every year. It is very easy to forget abstract achievements such as algebra, which are not repeated by the student and not used in daily life. Studies have shown that students have difficulty in understanding variables, which are the most basic structural unit of algebra, and that students think that letters are only used to express words briefly (Kieran, 1992). Akıncı (2012) stated that the equal sign is a mathematical symbol that is used only when finalizing operations in the students' perception world. The fact that algebra is one of the most problematic learning areas in mathematics has led educators and researchers to look for more efficient methods in teaching algebra. Scenario-based teaching is one of the teaching methods that can meet this need. The use of this method is important in that it allows students to make connections with real-life problems in algebra. Laying a solid foundation in Algebra in the 6th and 7th grades will benefit students in the HSEE exam they will take in the 8th grade. Moreover, considering that algebra is a learning field that contains abstract information and is not encountered much in daily life, the use of scenario-based learning method is more important. It is thought that the student's learning of algebra through experience will increase his/her self-confidence in mathematics class. With this study, teachers can examine the use of the scenario-based learning method in teaching algebra, which has its own language and structure, and gets an idea about its use in other difficult and abstract mathematics subjects. Thus, it is thought that scenarios, which have an important effect in teaching, will benefit the field of algebra learning by going beyond teaching lessons with rules and concepts. Therefore, it is thought that the use of scenario-based learning method in teaching algebra in the secondary school

mathematics curriculum will increase success in skill-based questions by enabling students to change their perspective on real-life problems.

When looking at the literature, it can be seen that course success and permanence in learning (Cornely, 1998; Sorin, 2014; Pektezel, 2017; Karcı, 2018; Aslan, 2019) are examined in studies on the scenario-based learning method. However, there are also studies (Flynn & Klein, 2001; Çakır, 2017; Taneri, 2018) that include students' opinions about the teaching method. When we look at the studies on the scenario-based learning method, it is seen that its relationship with many disciplines has been examined (Yaman and Süğümlü, 2009; Kocadağ, 2010; Bakaç, 2014; Tupe, 2015; Kemiksiz, 2016; Temur and Turan, 2018; Tol, 2018). It has been observed that there are not enough studies that include gifted students and the field of algebra learning. As a result of the study, it is expected that teaching will become more concrete and understandable by showing the different and entertaining sides of mathematics with the scenario-based learning method. In addition, moving beyond abstract and monotonous expressions in mathematics teaching is important in terms of creating different learning environments that will increase students' interest in the course, offering sample activities and giving ideas to teachers.

The purpose of this research is to investigate the effect of the scenario-based learning method in 6th and 7th grade Algebra teaching on the success of gifted and nongifted students in skill-based questions and their opinions about teaching. Based on the stated purpose, the following problems and sub-problems were examined:

Does the scenario-based learning method in teaching algebra have an effect on the success of gifted and nongifted students in skill-based questions and what are the student opinions about teaching? Subproblems are;

- Is there a significant difference between the pretest scores of the experimental and control group nongifted students?
- Is there a significant difference between the pretest and posttest scores of the experimental group nongifted students?
- Is there a significant difference between the pretest and posttest scores of control group nongifted students??
- Is there a significant difference between the posttest scores of the experimental and control group nongifted students?
- Is there a significant difference between the pretest and posttest scores of gifted students?
- What are the opinions of gifted students about the scenario-based learning method in teaching algebra?
- What are the opinions of nongifted students about the scenario-based learning method in teaching algebra?

Method

Research Design

The model of the research is a mixed method research in which qualitative and quantitative data are handled together, as it aims to examine the effect of the scenario-based learning method in algebra teaching on the success of gifted and nongifted students in skill-based questions and their opinions about teaching. Mixed method research is when the researcher combines qualitative and quantitative method approaches and concepts (Johnson and Onwuegbuzie, 2004). Among mixed method studies, explanatory design was used. In the explanatory design, firstly the quantitative data and then the qualitative data are obtained. Qualitative data are used to support quantitative data and detail emerging situations (Yıldırım and Şimşek, 2018).

The qualitative dimension of the research was carried out in the same way for the experimental group of gifted and nongifted students, and opinions about the application were received from the students in the experimental group. In this study, a case study was used because it was intended to examine the algebra achievement taught by applying the scenario-based learning approach, the students' algebra success in skill-based questions, and the impression this learning approach left on the students. Case study is an approach that allows systematic information to be collected and examined in detail about the research (Chmiliar, 2010).

Study Group

The research was conducted in the first semester of the 2022-2023 academic year with 6th and 7th grade students at a Boarding Secondary School and Science and Art Centre in the Central district of Kars province. The population of the research consists of all secondary school 6th and 7th grade students in the Central district of Kars province, while the sample consists of 6th grade (N = 33) and 7th grade (N = 32) students in the Regional Boarding Secondary School and Science and Art Center in this district, where the application was carried out.

The reason why 6th and 7th grade students were selected in this research is that the curriculum of these grade levels includes intensive learning algebra and these achievements are suitable for expressing with scenarios. Algebra learnings are heavily included in the 8th grade, but since the learnings are too abstract and complex, they are not suitable for script writing. Appropriate sampling method was used because the researcher worked at Regional Boarding Secondary School, one of the application schools, and participation in the research was voluntary. This method is a method that the researcher creates by starting from the group that is easiest to reach in order to avoid loss of labour and time (Büyüköztürk et al ., 2016). Due to the association of the study with the scenario and its connection with creativity, it was desired to examine the effect of the study on gifted students, and criterion sampling, one of the purposeful sampling methods, was used when selecting the other application school, the Science and Art Centre. In criterion sampling, the sample is created from individuals, events or situations with specified qualifications (Büyüköztürk et al ., 2016). The quantitative dimension of the research was carried out in two different ways in two schools. The first school where the application took place is a public school with nongifted students and therefore, sufficient numbers for the control and experimental groups were reached. Since there was no significant difference in the pretest result, one of the two classes was determined by lottery as the experimental group and the other as the control group. Since the second school where the application was carried out was at the Science and Art Center affiliated with the Ministry of National Education, where gifted students were located, only the experimental group was formed because the sufficient number of students could not be reached.

Data Collection Tool

To obtain the quantitative data in the research, a pretest and a posttest for 6th and 7th Grade Algebra Achievement, which included skill-based questions consisting of algebra achievements, were created. The test consists of 15 questions for the 6th grade level and 20 questions for the 7th grade level. The number of questions varies depending on students' grade level and exposure to skill-based questions. The distribution of the achievements in the skill-based questions was taken into consideration and all the achievements processed with the scenario were included.

The table below shows the distribution of the items in the pretest and posttest according to achievement.

M.6.2.1.1. Writes an algebraic expression appropriate to a verbally given situation and a verbal situation appropriate to a given algebraic expression.

M.6.2.1.2. It calculates the value of the algebraic expression for different natural number values that the variable will take.

M.6.2.1.3. Explains the meaning of simple algebraic expressions.

Table 1. Distribution of 6th grade algebra subject pretest and posttest question items according to gains

Achievements	Related question items	% Total Achievment
M.6.2.1.1.	1,3,12,13,14	33.3%
M.6.2.1.2.	7,8,9,11,15	33.3%
M.6.2.1.3.	2,4,5,6,10	33.3%
Total	15	%100

M.7.2.1.1. Performs addition and subtraction operations with algebraic expressions.

M.7.2.1.2. Multiplies an algebraic expression by a natural number.

M.7.2.2.1. Understands the principle of conservation of equality.

Table 2. Distribution of 7th grade algebra subject pretest and posttest question items according to gains

Achievements	Related question items	% Total Achievment
M.7.2.1.1.	4,5,7,10,15,16,17	35%
M.7.2.1.2.	1,2,9,11,14,20	30%
M.7.2.2.1.	3,6,8,12,13,18,19	35%
Total	20	%100

All of the questions in the test were prepared from the questions published on the official website of the General Directorate of Measurement, Evaluation and Examination Services of the Ministry of National Education and in the

study fascicles of the Measurement and Evaluation Centers of the provinces affiliated to the Ministry of National Education, in order to ensure validity and reliability. While creating the test, it was determined by paying attention to the number and equal distribution of the achievments, and no items were removed from the first prepared test. After the Algebra Achievement tests were prepared, two academicians and two mathematics teachers were consulted and their opinions were obtained. In order to give the necessary time to the questions in the test and to detect any unclear situations, thirty-two 8th grade students were selected for the 7th grade Algebra Achievement test pilot application and twenty-eight 7th grade students were selected for the 6th grade Algebra Achievement test pilot application. After the pilot application, the time was determined as 30 minutes for 6th grades and 45 minutes for 7th grades.

Qualitative data were obtained from the semi-structured Opinion Form created regarding the scenario-based learning approach of the students in the experimental group. The opinion form, which aims to examine student opinions about the scenario-based learning method applied to the experimental group, was developed by Karasu (2019) and the questions in the interview form were adapted by the researcher according to the Algebra learning field and took its final form. The interview form is in the form of a semi-structured form. Semi-structured interviews offer participants the opportunity to express themselves and gain in-depth information about the subject (Büyüköztürk et al ., 2016, p.154). The students in the experimental group were asked questions about the algebra subject being taught with the scenario-based learning method and how effective this method was on skill-based questions, and their opinions were received. The data obtained were collected into 3 themes: Attitude, Opinion and Anxiety. The questions that make up the interview form regarding the scenario-based learning method are grouped under these 3 themes.

Data Analysis

While there are 15 questions in the pretest and posttest at the 6th grade level, there are twenty questions at the 7th grade level. The questions in the achievement test were prepared as multiple choice at both grade levels. "1" point was given for the correct answer, and "0" point was given for the wrong and blank answers. During data analysis, the scores received by students were converted to a 100-point system due to the difference in the number of questions at grade levels. A student who answers all questions correctly receives 100 points, and a student who answers all questions incorrectly receives 0 point.

In the analysis of the data obtained in this research, which examined the effect of the scenario-based learning method in teaching algebra on students' success in skill-based questions, the normality of the data was first examined. Median and arithmetic mean values, Kolmogorov-Smirnov and Shapiro Wilk tests, QQ plots and box plots were examined for normality in the pretest and posttest of nongifted students. Since the study group was below 50 people, the Shapiro Wilk test was taken into account in the analysis of the data. It was determined that the data were not normally distributed. The results of normality tests are given in Table 3.

Table 3. Normality test results

Class	Test	Group	Kolmogorov-Smirnov			Shapiro-Wilk		
			Statistics	SD	p	Statistics	SD	p
6th grade	Pretest	Control	.237	15	.023	.881	15	.049
		Experiment	.251	15	.012	.878	15	.045
	Posttest	Control	.205	15	.091	.889	15	.044
		Experiment	.190	15	.151	.893	15	.075
7th grade	Pretest	Control	.210	14	.094	.916	14	.194
		Experiment	.201	14	.128	.857	14	.027
	Posttest	Control	.244	14	.024	.811	14	.007
		Experiment	.143	14	.200	.955	14	.634

In the analysis of the data of nongifted students, the Mann Whitney U test was used to compare the scores of two non-parametric tests, and the Wilcoxon test was used to compare the scores of two groups from a single group. Due to the current number of gifted students, the total success scores of the pretest and posttest were interpreted according to development and regression.

Content analysis was used to analyze the qualitative data obtained through the opinion form applied to examine the opinions of all experimental group students about the application. In the content analysis method, the researcher created codes and thematic categories according to the answers given to the questions and made them meaningful by determining the frequencies. Thus, the data examined were dug deeper, and the data were conceptualized and interpreted without deviating from the purpose (Yıldırım and Şimşek, 2018).

Findings

In this part of the research, the findings and comments of the pretest and posttest, which are the achievement tests applied to the experimental and control groups in order to measure the success of the students on skill-based questions of the scenario-based learning method in teaching algebra, are included. In addition, the findings and comments that were analyzed qualitatively and included the opinions of the experimental group are also included in this section.

Findings for Sub-Problem 1

The data of the question "Is there a significant difference between the skill-based achievement test pretest scores of the experimental and control group students of the algebra course taught with the scenario-based learning method for 6th grade grade nongifted students?" were analyzed with the Mann Whitney U test because they did not show a normal distribution and the analysis results are given in Table 4.

Table 4. Difference between pretest achievement scores of 6th grade experimental and control groups nongifted students

	Group	**N**	**Hydrangea**	**Rank Avg.**	**Rank Total**	**U**	**Z.**	**p**
Achievement test	Control	15	26.64	16.47	247.00	98.00	-.624	.533
	Experiment	15	19.98	14.53	218.00			

When Table 4 is examined, it is seen that there is no significant difference according to the pretest success scores of the experimental and control group group nongifted students [U=98.00, z=-.624, p> .05]. "Is there a significant difference between the skill-based achievement test pretest scores of the experimental and control group students of the algebra course taught with the scenario-based learning method for 7th grade s grade nongifted students? Since the data for the question did not show a normal distribution, analysis was made with the Mann Whitney U test and the analysis results are given in Table 5.

Table 5. Difference between pretest achievement scores of 7th grade experimental and control groups groups nongifted students

	Group	**N**	**Hydrangea**	**Rank Avg.**	**Rank Total**	**U**	**Z.**	**p**
Achievement test	Control	14	30.00	15.04	210.50	90.50	-.353	.724
	Experiment	14	30.00	13.96	195.50			

When Table 5 is examined, it is seen that there is no significant difference according to the pretest success scores of the experimental and control group nongifted students [U=90.50, z=-.353, p> .05].

Findings for Sub-Problem 2

Since the data of the question "Is there a significant difference between the skill-based achievement test pretest and posttest scores of the experimental group students of the algebra course taught with the Scenario-based learning method for 6th grade grade nongifted students?" was not normally distributed, it was analyzed with the Wilcoxon test and The analysis results are given in Table 6.

Table 6. Difference between pretest and posttest scores of the 6th grade experimental group without a special talent diagnosis

	Test	**N**	**Hydrangea**	**Z.**	**p**
Experimental group	Pretest	15	19.98	-3.420	.001
	Posttest	15	53.28		

When Table 6 is examined, it is seen that there is a significant difference between the skill-based achievement test pretest and posttest scores of the experimental group students of the algebra course taught with the scenario-based learning method (Z = -3.420, p < .05). When the median value (Mean = 53.28) is examined, it is understood that the significant difference is in favor of the posttest. This result shows that the algebra course taught with the scenario-based learning method is effective in the experimental group.

"Is there a significant difference between the skill-based achievement test pretest and posttest scores of the experimental group students of the algebra course taught with the scenario-based learning method for 7th grade grade nongifted students? Since the data for the question '' did not show a normal distribution, the analysis was made with the Wilcoxon test and the analysis results are given in Table 7.

Table 7. Difference between pretest and posttest scores of the 7th grade experimental group nongifted students

	Test	N	Hydrangea	Z.	p
Experimental group	Pretest	15	30.00	-3.089	.002
	Posttest	15	45.00		

When Table 7 is examined, it is seen that there is a significant difference between the skill-based achievement test pretest and posttest scores of the experimental group students of the algebra course taught with the scenario-based learning method (Z = -3.089, p < .05). When the median value (Mean = 45.00) is examined, it is understood that the significant difference is in favor of the posttest. This result shows that the algebra course taught with the scenario-based learning method is effective in the experimental group.

Findings for Sub-Problem 3

Since the data for the question "Is there a significant difference between the skill-based achievement test pretest and posttest scores of the 6th grade control group group nongifted students?" was not normally distributed, the analysis was made with the Wilcoxon test and the analysis results are given in Table 8.

Table 8. Difference between pretest and posttest scores of the 6th grade control group nongifted students

	Test	N	Hydrangea	Z.	p
Control Group	Pretest	15	26.64	-1.754	.079
	Posttest	15	33.30		

When Table 8 is examined, it is seen that there is no significant difference between the skill-based achievement test pretest and posttest scores of the control group group nongifted students (Z= -1.754, p> .05). This result shows that the regular course taught in the control group increased the success in skill-based questions, but this increase shows that it is not significant.

''Is there a significant difference between the skill-based achievement test pretest and posttest scores of 7th grade control group control group nongifted students? Since the data for the question "" did not show a normal distribution, the analysis was made with the Wilcoxon test and the results of the analysis are given in Table 9.

Table 9. Difference between pretest and posttest scores of the 7th grade control group nongifted students

	Test	N	Hydrangea	Z.	p
Control Group	Pretest	14	30.00	-1.558	.119
	Posttest	14	30.00		

When Table 9 is examined, it is seen that there is no significant difference between the skill-based achievement test pretest and posttest scores of the control group nongifted students (Z= -1.558, p> .05). This result shows that the regular course taught in the control group has no effect on skill-based success.

Findings for Sub-Problem 4

"Is there a significant difference between the skill-based achievement test posttest scores of the experimental and control group students of the algebra course taught with the scenario-based learning method for 6th grade students grade nongifted students? Since the data for the question '' did not show a normal distribution, analysis was made with the Mann Whitney U test and the results of the analysis are given in Table 10.

Table 10. Difference between posttest achievement scores of 6th grade experimental and control groups nongifted students

	Group	N	Hydrangea	Rank Avg.	Rank Total	U	Z.	p
Achievement test	Control	15	33.30	9.13	137.00	17.00	-4.017	.000
	Experiment	15	53.28	21.87	328.00			

When Table 10 is examined, it is seen that there is a significant difference according to the posttest success scores of the experimental and control group students group nongifted students [U=17.00, z=-4.017, p< .05]. When the posttest median value of the experimental group (Mean = 53.28) is compared with the posttest median value of the control group (Mean = 33.30), it is understood that the significant difference is in favor of the experimental group. This result shows that the algebra course taught with the scenario-based learning method is effective on the posttest scores of the experimental group.

The data of the question "Is there a significant difference between the skill-based achievement test posttest scores of the experimental and control group students of the algebra course taught with the scenario-based learning method for 7th grade grade nongifted students?" were analyzed with the Mann Whitney U test because they did not show a normal distribution and the analysis results are given in Table 11.

Table 11. Difference between posttest achievement scores of 7th grade experimental and control groups groups nongifted students

	Group	N	Hydrangea	Rank Avg.	Rank Total	U	Z.	p
Achievement test	Control	14	30.00	9.25	129.50	24.50	-3.435	.001
	Experiment	14	45.00	19.75	276.50			

When Table 11 is examined, it is seen that there is a significant difference according to the posttest success scores of the experimental and control group students group nongifted students [U=24.50, z=-3.435, p< .05]. When the posttest median value of the experimental group (Mean = 45.00) is compared with the posttest median value of the control group (Mean = 30.00), it is understood that the significant difference is in favor of the experimental group. This result shows that the algebra course taught with the scenario-based learning method is effective on the posttest scores of the experimental group.

Findings for Sub-Problem 5

"Is there a significant difference between the pretest and posttest scores of scores of gifted students? In order to find an answer to the question "", an experimental group was formed with 6th grade 6th grade gifted students, and the pretest-posttest scores of three students in the experimental group were examined. 6th grade students were randomly coded as 6S1, 6S2, 6S3. Correct answers were given 1 point, incorrect and blank answers were given 0 point. Due to the current number of 6th grade gifted students, the questions in the achievement test were categorized in terms of achievement, and then the score and total scores of the achievements were interpreted according to development and regression. The benefits are as stated below.

Learning Achievment: M.6.2.1.1. Writes an algebraic expression appropriate to a verbally given situation and a verbal situation appropriate to a given algebraic expression.

Learning Achievment: M.6.2.1.2. It calculates the value of the algebraic expression for different natural number values that the variable will take.

Learning Achievment: M.6.2.1.3. Explains the meaning of simple algebraic expressions.

Attainment achievement evaluations of sixth grade grade gifted students are given in Table 12.

Table 12. Evaluation of achievement success of 6th grade gifted students

		Achievement 1	Achievement 1	Achievement 1	Total score
6S1	Pretest	2	2	0	4
	Posttest	4	5	4	13
	Evaluation	+	+	+	+

6S2	Pretest	4	2	4	10
	Posttest	5	5	5	15
	Evaluation	+	+	+	+
6S3	Pretest	2	2	2	6
	Posttest	4	4	3	11th
	Evaluation	+	+	+	+

(The + symbol symbolizes development, the - symbol symbolizes regression, and the / symbol symbolizes the absence of change.)

In line with the data obtained, an increase was observed in all achievement dimensions and total scores of all 3 students. While the student coded 6S1 obtained a total of 0 points in the 3rd achievement come in the pretest, after the application, he made progress in four of the five questions of the 3rd achievement and answered correctly. The student coded 6S2, who got the highest score in the pretest, answered all the questions correctly in the posttest after the application and received a full score. The student coded 6S3, like the other students, made progress in every achievement and increased his total score. When we look at the increases in students' achievements in general, it is seen that the biggest increase difference in total is in the 2nd achievement.

''Is there a significant difference between the pretest and posttest scores of gifted students? In order to find an answer to the question "", an experimental group was formed with 7th grade gifted students, and the pretest-posttest scores of the four students in the experimental group were examined. 7th grade students were randomly coded as 7S1, 7S2, 7S3 and 7S4. Correct answers were given 1 point, incorrect and blank answers were given 0 point. Due to the current number of 7th grade gifted students, the questions in the achievement test were categorized in terms of achievement, and then the score and total scores of the achievements were interpreted according to development and regression. The benefits are as stated as follows:

M.7.2.1.1. Performs addition and subtraction operations with algebraic expressions.

M.7.2.1.2. Multiplies an algebraic expression by a natural number.

M.7.2.2.1. Understands the principle of conservation of equality.

Attainment achievement evaluations of sixth grade gifted students are given in Table 13.

Table 13. Evaluation of attainment achievement of 7th grade gifted students

		Achievement 1	**Achievement 1**	**Achievement 1**	**Total score**
7S1	Pretest	6	4	5	15
	Posttest	6	5	5	16
	Evaluation	/	+	/	+
7S2	Pretest	5	3	3	11th
	Posttest	6	5	4	15
	Evaluation	+	+	+	+
7S3	Pretest	3	0	one	4
	Posttest	4	5	2	11th
	Evaluation	+	+	+	+
7S4	Pretest	5	2	3	10
	Posttest	7	6	4	17
	Evaluation	+	+	+	+

(The + symbol symbolizes development, the - symbol symbolizes regression, and the / symbol symbolizes the absence of change.)

In line with the data obtained, the total score of all 4 students increased. There was no change in the success scores of the student coded 7S1 in the 1st and 3rd objectives. Students coded 7S2 and 7S4 increased their scores in all achievements and also increased their total scores. The student coded 7S3 received 0 in the pretest. 2. He received 5 points by answering all of the achievement questions correctly in the posttest. When we look at the increases in students' achievements in general, it is seen that the biggest increase difference in total is in the 2nd achievement.

Findings for Sub-Problem 6

In order to find an answer to the question " What are the opinions of gifted students about the scenario-based learning method in teaching algebra?", the opinions of the students were taken with a semi-structured form after a two-week lesson taught with scenario-based learning with the experimental group. By examining the students' answers, the answers were divided into the themes of attitude, opinion and anxiety. Themes were then detailed into categories and codes. Analyzes regarding the answers are given in the tables below.

Table 14. Distribution of gifted student opinions about scenario-based learning method in teaching algebra according to the codes of attitude theme

Categories	Codes	f	%
Attitude	Effective	3	42.8
	Fun	2	28.6
	Curious	2	28.6

As seen in Table 14, student opinions regarding the attitude theme were examined and a single category was created based on the answers. According to the answers obtained, students defined themselves as more effective (42.8%) in lessons taught with scenario-based learning in algebra teaching. In addition to feeling effective, students were curious about scenario-based learning (28.6%) and thought it was fun (28.6%). Sample student answers are given below.

"It was enjoyable to be included in the scenarios and be active, it helped me reinforce the subject." (S1)

"It was more fun than traditional teaching. "I thought this teaching method was more useful for me." (S4)

"Doing a verbal activity in mathematics class made me curious. The questions were also interesting."(S3)

Table 15. Distribution of gifted student opinions about scenario-based learning method in teaching algebra according to categories and codes of the opinion theme

Categories	Codes	f	%
Positive	Effective permanent learning	4	57.1
	Use in other mathematics units	1	14.3
	Use in other branches	1	14.3
Negative	Long lasting	1	14.3

As seen in Table 15, student opinions regarding the opinion theme were examined and two categories were created according to the answers. The number of students who think that the lessons taught according to the scenario-based learning method in algebra teaching provide permanent learning by doing and experiencing compared to the current teaching (57.1%) is quite high. In addition, it was concluded that students wanted this method to be used in other challenging mathematics subjects (14.3%) and in all other branches (14.3%). Students also expressed the opinion that teaching lessons with this method takes too long (14.3%). Sample student answers are given below.

"It was a method that enabled students to understand algebra by participating in the activity. "I think it will make learning easier for students who have difficulty in mathematics." (S6)

"I think it can be used in every subject other than algebra, and it would also be useful to use it in a course other than mathematics." (S4)

"Some mathematics subjects are suitable for the structure of this method, and it may be good to use it in those units." (S3)

"It took longer than other courses." (S7)

Table 16. Distribution of gifted student opinions about scenario-based learning method in algebra teaching according to the codes of the anxiety theme

Categories	Codes	f	%
Anxiety	Decrease in anxiety	4	57.1
	Don't feel comfortable	3	42.9

As seen in Table 16, student opinions regarding the theme of anxiety were examined and two codes were created based on the answers. When the opinions against the scenario-based learning method in algebra teaching were examined, it was concluded that the students' anxiety decreased compared to the current teaching (57.1%) and they felt comfortable because they understood the subject better (42.9%). Sample student answers are given below.

"In this teaching method, I was able to use my imagination as I wished and expressed my questions freely." (S2)

"It encourages students to participate in the lesson in a very entertaining way." (S6)

"When I did not understand the subject in mathematics, I was very nervous in case they asked questions, but since I understood the subject, I did not hesitate at all." (S5)

Findings for Sub-Problem 7

In order to find an answer to the question " What are the opinions of nongifted students about the scenario-based learning method in teaching algebra?", the opinions of the students were taken with a semi-structured form after a two-week course taught based on the scenario-based learning method with the experimental group. By examining the students' answers, the answers were divided into the themes of attitude, opinion and anxiety. Themes were then detailed into categories and codes. Analyzes regarding the answers are given in the tables below.

Table 17. Distribution of nongifted student opinions about the scenario-based learning method in teaching algebra according to categories and codes of the attitude theme

Categories	Codes	f	%
Positive	Fun	8	27.59
	Excited	11	37.92
	Curious	8	27.59
Negative	Roles not distributed equally	1	3.45
	Long lasting	1	3.45

As seen in Table 17, student opinions regarding the attitude theme were examined and two categories were created based on the answers. When the answers are examined, the number of students who find the lessons taught with the scenario-based learning method in Algebra teaching exciting is more (37.92%). It seems that most of the student opinions about the algebra course taught with this method are positive. Sample student answers are given below.

"It was like we did theater rather than our usual lectures, I had a lot of fun. "I liked the roles very much and it was very enjoyable to act out the roles with my friends." (S22)

Normally, the problem is given to us and we solve it, but solving questions based on other people's experiences is a very exciting thing. "I especially loved the role of the gray-bearded grandfather because he helped us solve the problem with the advice he gave to the princess." (S5)

"I wondered what we would do since it was our first time teaching such a lesson. As the scenarios were processed, I was able to figure out how the characters would solve the problems myself, which made me feel good' (S7)

"Some roles were more like leading roles, some were less prominent, I wish they were all cast in the same way" (S4)

"I actually liked it, but it seemed like we dwelled on it for too long " (S16)

Table 18. Distribution of nongifted student opinions about the scenario-based learning method in teaching algebra according to categories and codes of the opinion theme

Categories	Codes	f	%
Towards Scenario-Based Learning Approach	Making algebra easy	10	34.48
	Permanent learning	14	48.27
Future Course Processing	All math units	4	13.8
	Some math units	1	3.45

As seen in Table 18, student opinions regarding the opinion theme were examined and two categories were created based on the answers. According to student answers, it is seen that the lessons taught according to the scenario-based learning method in teaching algebra provide permanent learning by doing and experiencing (48.27%), and also make learning algebra easier (34.48%). In addition, it was concluded that students may prefer to use this method in all mathematics courses (13.8%) or in certain units (3.45). Sample student answers are given below.

"I think if we teach all mathematics lessons like this, we will understand every subject very well. "It was like we were playing a game, not in a math class." (S17)

"I remembered the lesson better because I was involved in the lesson and participated actively. "I was curious and learned while having fun." (S11)

"Algebra is not like a math class. It contains letters and variables, it seems very complicated, but this method helped me understand it better by making an analogy." (S21)

"If the issue of ratio and proportion had been explained with this method, I would have understood it better. It seemed very complicated." (S25)

Table 19. Distribution of nongifted student opinions about the scenario-based learning method in teaching algebra according to categories and codes of the anxiety theme

Categories	Codes	f	%
Positive	Don't feel comfortable	18	62.06
	Active participation	8	27.59
Negative	Fear of change	2	6.9
	Had no effect	1	3.45

As seen in Table 19, student opinions regarding the theme of anxiety were examined and two categories were created based on the answers. The majority of the students stated that they felt more comfortable in the Algebra lesson taught with the scenario-based learning method compared to the current teaching (62.06%) and that they showed a desire to participate in the lesson more (27.59%). In addition, there are also student opinions that talk about the fears brought by change (6.9%) and that it does not affect anxiety (3.45%). Sample student answers are given below.

"Since I understood the subject, I did not hesitate to raise my hand and participated in the lesson more." (S29)

"It seems more complicated when you learn with rules. This method seemed more friendly and comfortable." (S28)

"I was a little hesitant because it was the first time we had a lesson like this and I was afraid of making mistakes because I wasn't used to it." (S9)

"The method had no effect on me. Mathematics is difficult and I can not do it." (S16)

Conclusion and Discussion

This research covers the effect of the scenario-based learning method in algebra teaching on the success of gifted and nongifted students in skill-based questions and their views on teaching. Suggestions regarding the results are also included in this section.

Achievment

When the pretest and posttest average results of the 6th and 7th grade experimental group students group nongifted students are examined, it shows that the effect of the course taught with the scenario-based learning method in algebra teaching on the success of the experimental group students in skill-based questions is significant. This research shows that using the scenario-based learning method in the algebra teaching process increases success in skill-based questions. Studies stating that mathematics lessons taught with the scenario-based learning method are beneficial in increasing student success and increase academic success (Bakaç, 2014; Kocayusuf, 2014) coincide with the results of the current

research. The fact that the scenario-based learning method contributes to the development of reflective thinking skills (Gülmez Güngörmez, Akgün, & Duruk, 2016) also confirms its positive result on skill-based questions. In addition, there are studies showing that lessons taught with this method support the permanence of courses taught with this method and increase course success in Science and Social Studies courses, apart from Mathematics (Aslan, 2019; Cornely, 1998; Kocayusuf, 2014; Kemiksiz, 2016; Yeniceli, 2016; Karcı, 2018; Pektezel, 2017).

When the pretest and posttest average results of the control group of 6th and 7th grade students grade nongifted students were examined, it was shown that the course taught by applying existing teaching methods in teaching algebra with the control group students had an effect on the students' success in skill-based questions, but there was no difference in this success. There are studies stating that in order to ensure student success in skill-based questions, the teacher must renew himself according to the system (Atay, 2021) and change the teaching method (Çetin, 2019). Therefore, it can be thought that the current learning method will be insufficient to ensure success in the skill-based questions of algebra, which is an abstract learning field, requiring high-level thinking, association and decision-making abilities. The traditional learning method is insufficient in teaching algebra, where abstract thinking and logical inference are at the forefront, so there are studies using different teaching methods in which the student is more active, interprets and structures the information, and can use mathematical language, and successful results are obtained with these methods (Akkaya, 2006; Nwabueze, 2006; Çağdeşer, 2008; Üner, 2009; Kaş, 2010; Görgün and Eken, 2020). Similarly, Hassan, Hammadi and Majeed (2023) found that students who used the scenario-based learning method in the course had lower mathematics achievement and mental motivation compared to students who used the traditional method. Stating that it is better is consistent with the research findings.

When the findings of the posttest averages applied to the experimental and control groups of 6th and 7th grade students grade nongifted students were examined, the averages were found to be significant in favor of the experimental group. In this case, the experimental group students who attended the algebra course taught with the scenario-based learning method were more successful in skill-based questions, while the control group students who took the course with the traditional method achieved lower success in skill-based questions. Compared to courses taught with existing methods and techniques, the scenario-based learning method improves critical thinking and increases decision-making skills in the problem-solving process (Golden, 2018), is a more successful method in non-routine problems (Temur and Turan, 2018), and helps students increase success by structuring their own knowledge (Papadimitriou, 2012) support the findings of the current research. This situation shows that students are in favor of the scenario-based learning method, which transforms the problems into concrete and enables them to make decisions in the plot, instead of the current learning method in skill-based questions.

When the pretest and posttests of the 6th and 7th grade experimental group students group gifted students were analyzed, an increase was observed in their total scores and achievement-based scores in favor of the posttest. The research shows that using the scenario-based learning method in the algebra teaching process increases the success of gifted students in skill-based questions, and that gifted students solve and pose real- life problems more easily when they enrich their mathematical experiences in the classroom environment, taking into account their creativity (Manuel & Freiman, 2017) has been proven. The development of students' reasoning and decision-making abilities with the scenario-based learning method (Singh, Pervak, Onyshchenko, & Yehorenko, 2023) supports the idea that it will facilitate the development of high-level thinking skills required for skill-based questions.

Student Opinions

When the opinions of the students in the experimental group gifted students were examined, they stated that in the attitude theme, the students saw themselves as more effective (42.8 %) in the algebra course taught with the scenario-based learning method. Scenario-based learning method attracts students' attention and is an effective way for them to gain sufficient skills in the applied subject (Mariappan, Angela, & Peter, 2004). and it seems to affect students' attitudes positively (Kocadağ, 2010; Çakır, 2017; Taneri, 2018). Likewise, Flynn and Klein (2001) stated that students using the scenario-based learning method showed an increase in their interest and motivation towards the course by revealing differences in performance and time management, which is another result that supports the current research. In the

opinion theme, the majority of the students think that using the scenario-based learning method in teaching algebra provides permanent learning by doing and experiencing (57.1 %). This result coincides with Sorin's (2014) view that students take a more active role and gain experience with real-life problems through the scenario-based learning method, which provides an authentic learning environment. In the theme of anxiety, it was observed that that gifted students had a decrease in their anxiety compared to the current education (57.1 %) and they felt more comfortable due to a good understanding of the subject (42.9%). A similar result was revealed in the study conducted by Özsevgeç and Kocadağ (2013) and it was stated that the scenario-based learning method made the learning process enjoyable by activating the students. In this case, it is thought that using the scenario-based learning method in algebra teaching lesson plans will be effective in reducing prejudices towards algebra and mathematics courses.

When the opinions of the nongifted students in the experimental group were examined were examined, they stated that the lessons taught with the scenario-based learning method in the attitude theme made them feel excited (37.92%), fun (27.59%) and curious (27.59%). In the opinion theme, the fact that the majority of the students stated that scenario-based learning provides permanent learning (48.27%) coincides with the study of Ciraj, Vinod and Ramnarayan (2010) stating that scenario-based learning makes knowledge permanent by providing active learning. In the research, regarding the anxiety theme, the majority of the students stated that they felt more comfortable (62.06%) compared to the current education. Süğümlü (2009) stated that the scenario-based learning method contributes to the students' communication skills by developing their imagination and creativity, and helps students concretely reflect the information they have learned by doing and experiencing into life. This is similar to the results of the research in which they stated that they were more comfortable. While the result of Çenberci and Tol (2019) that the scenario-based learning method positively affects students' self-efficacy perception coincides with the result of the current study, it contradicts the result that does not affect students' attitudes and anxiety towards the mathematics course.

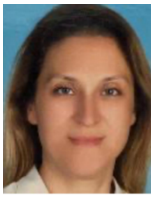
Recommendations

- Knowing that students are prejudiced against mathematics and skill-based questions, the scenario-based learning approach, in which the individual is active, learns while having fun, and makes it easier to connect with real life, can be preferred by teachers. Scenario writing and applications can be included in in-service and pre-service training so that teachers can improve themselves in this learning method.
- Making preliminary preparations for lessons to be taught with a scenario, paying attention to the time allotted in the lesson and the distribution of tasks of the people can be helpful in ensuring students' participation in the lesson.
- Scenario classes can be created in secondary schools and Science and Art Centres and all branch teachers can be encouraged to use them.
- The research is limited to 6th and 7th grade students in Kars province. For this reason, it can be applied at different grade levels and school types for the accuracy of generalizations.
- In terms of the reliability of the research, scenario-based learning method can be used for a longer period of time and follow-up studies can be carried out by obtaining detailed qualitative opinions.
- Since this research is limited to the algebra subject of the mathematics course, scenario-based learning method can be used in different disciplines and subject areas and students' opinions on success and teaching can be detailed.

Acknowledgment

We would like to thank Kafkas University Scientific Research Coordination Office for the support given to this study within the scope of the project 2023-SB-22. This study received permisson from the Kafkas University Ethics Committee on 16.09.2022

Biodata of Authors



Esra Altintaş got her undergraduate degree from Aegean University, Faculty of Science, Department of Mathematics in 2004. She got her master and Phd degree from Marmara University, Institute of Educational Sciences, department of mathematics education.She worked as a lecturer and research assistant at the Faculty of Education of Kafkas University between 2005-2007.She worked as a research assistant in the mathematics education program of faculty of education of Marmara University between 2007-2015.She worked as Assoc. Dr. at Kafkas University between 2015-2018. She got the title of associate professor in 2018 and worked in the mathematics education program of faculty of education of Kafkas University until 2022. She has been working in the mathematics education program of faculty of education of Aydın Adnan Menderes University since 2022. Her areas of expertise are mathematics education, mathematics education in gifted students and differentiation approaches. Aydın Adnan Menderes University Faculty of Education, esra.altintas@adu.edu.tr ORCID 0000-0003-3311-7179

Şükrü İlgün graduated from faculty of education of Atatürk University as a mathematics teacher in 2000. He worked as a teacher at the Ministry of Education between 2000 and 2014, and in 2014 he started working as a faculty member at Kafkas University Dede Korkut Faculty of Education and continues to work there. Kafkas University Dede Korkut Faculty of Education, mat.ilgun@hotmail.com ORCID 0000-0002-2842-2032

Ceren ercan graduated from faculty of education of Trakya University as a mathematics teacher in 2020. She got her master degree from Kafkas University, Institute of Educational Sciences, department of mathematics education. She work as a teacher at the state school. Kars Kafkas University Institute of Educational Sciences, cerenercan35@gmail.com ORCID:0000-0002-8595-131X

References

Akıncı, M. (2012, June). *A study on the meanings of the equal sign with primary school mathematics teaching students.* Paper presented at the Xth National Science and Mathematics Education Congress. Karaelmas University, Zonguldak.

Akkaya, R. (2006). *The effectiveness of the activity-based approach in eliminating the misconceptions encountered by sixth grade primary school students in the field of learning algebra* [Unpublished master's thesis]. Abant İzzet Baysal University, Institute of Social Sciences, Bolu.

Altun , M. (2006). Advances in mathematics teaching. *Journal of the Faculty of Education, Xıx* (2), 223-238.

Aslan, S. (2019). the impact of argumentation-based teaching oath scenario-based learning method on the students ' academic achievement *_Journal of Baltic Science Education , 18* (2), 171-183, 201918. 10.33225 / Jbse /19.18.171.

Atay, S.N. (2021). *Teachers' opinions on skill-based questions of the 8th grade Turkish and Turkish Republic History of Revolution and Kemalism course* [Unpublished master's thesis]. Amasya University, Social Sciences Institute, Amasya.

Bakaç, E. (2014). The effect of scenario-based teaching method on student success in mathematics course. *Journal of Education and Humanities: Theory and Practice, 5* (9), 3-17.

Büyüköztürk, Ş ., Kılıç, Ç. E., Akgün, Ö. E., Karadeniz, Ş. and Demirel, F., (2016). *Scientific research methods.* Pegem Academy, Ankara.

Chmiliar , L. (2010). Multiple -Case Designs . In A. J. Mills , G. Eurepas & E. Wiebe (Eds .), Encyclopedia of Case Study Research (Pp 582-583). USA: Sage Publications.

Ciraj , A.M. , Vinod , P. and Ramnarayan , K. (2010). enhancing active learning in microbiology through case based learning : experiences from an Indian medical school _ *Indian Journal of Pathology oath Microbiology , 53* (4), 729-733.

Cornely , K. (1998). Use of case studies in an undergraduate biochemistry course *_Journal of Chemical education , 75* (4), 475-478.

Çağdaşer , BT (2008 *). The effect of teaching the field of algebra learning with a constructivist approach on the algebraic thinking levels of 6th grade students* [Unpublished master's thesis]. Uludağ University, Institute of Social Sciences, Bursa.

Çağlar, D. (2004). Characteristics of Gifted Children . *Ankara University Faculty of Educational Sciences Journal, 5* (3), 95-110.

Çakır, U. (2017). *The effect of scenario-based education on secondary school students' knowledge and attitude levels regarding disasters* [Unpublished master's thesis]. Gazi University Institute of Educational Sciences, Ankara.

Çenberci , S. & Tol, H. Y. (2019). The Effect of Scenario-Based Learning Method on Students' Mathematics Self-Efficacy Perception, Attitudes and Anxiety. *Anemon Muş Alparslan University Journal of Social Sciences , 7* (4), 149-159. Date : 10.18506 /Anemon.523065

Cetin, B.S. (2019). Examining the opinions *of mathematics teachers regarding the 2018 Lgs system* [Unpublished master's thesis]. Sakarya University Institute of Educational Sciences, Sakarya.

Dede, Y and Argün, Z. (2003). Why is Algebra Difficult for Students ? *Hacettepe University Faculty of Education Journal,* 24, 180-185.

Flynn , A. E. & Klein , J. D. (2001). the Influence of discussion groups in A case-based learning environment . *educational Technology , Research and Development, 49* (3), 71-86.

Geçer, A. & Özel, R. (2012). Problems experienced by primary school science and technology teachers in the learning-teaching process. *Educational Sciences in Theory and Practice , 12* (3), 2237- 2261.

Golden, P. (2018). contextualized writing : promoting audience-centered writing through scenario-based learning _ *international journal for the Scholarship of Teaching and Learning , 12* (1), 1-9.

Görgün, G. & Eken, Z. (2020). The effect of hands -on activities on student success in teaching algebra subjects in 7th grade mathematics course . *International Journal of Educational Researchers, 3* (2), 346-362.

Gülmez Güngörmez, H. , Akgün, A. & Duruk, Ü. (2016). Developing students' reflective thinking skills through scenario-based learning. the Journal of Academic Social Science Studies , 48, 459-475. doi Number : Retrieved from http://Dx.Doi.Org/ 10.9761 /Jasss3584.

Hassan, A.K. , Hammadi , S.S., & Majeed , B.H. (2023). the impact of a scenario-based learning model in mathematics achievement oath mental motivation for high school students _ *International Journal of Emerging Technologies in Learning (Online), 18* (7), 103.

Johnson, R. B. & Onwuegbuzie , A. J. (2004). Mixed methods research : A research paradigm whose time has come . *educational Researcher , 33* (7): 14-26.

Karasu, A. (2019). The effect of *scenario-based learning-teaching approach on 7th grade students' attitudes towards English lessons and their views and concerns about learning English* . [Unpublished master's thesis]. Balıkesir University Social Sciences Institute, Balıkesir.

Karci, M. (2018). *Examining the effect of scenario-based learning approach (stoy) based on STEM activities on students' academic achievements, career choices and motivation* [Unpublished master's thesis]. Çukurova University Social Sciences Institute, Çukurova.

Kas, S. (2010). *The effect of teaching with worksheets on algebraic thinking and problem solving skills in eighth grade* [Unpublished master's thesis]. Marmara University, Istanbul.

Boneless, C. (2016). 6th *grade The effect of scenario-based learning method on academic achievement, attitude and retention in science course* [Unpublished master's thesis]. Abant İzzet Baysal University Institute of Educational Sciences, Bolu.

Kieran , C. (1992). *the learning oath teaching of school algebra* _ In DA Grouws (Ed.), Handbook of Research on Mathematics Teaching and Learning (Pp . 390-419) . New York: Macmillan .

Kocadağ, Y. (2010). *Scenario The effect of based learning method on eliminating misconceptions about genetics* [Unpublished master's thesis]. Karadeniz Technical University, Institute of Science and Technology, Trabzon.

Kocayusuf , A. (2014). *Primary education The effect of mastery learning strategy supported by life-based scenarios in mathematics education on students' learning products* [Unpublished master's thesis]. Akdeniz University Institute of Educational Sciences, Antalya.

Manuel, D. & Freiman , V. (2017). differentiating instruction using a virtual environment : a study of mathematical problem posing among gifted oath talented learners . *Global Education Review , 4* (1), 78-98. Https://Eric.Ed.Gov/?İd=Ej1137999

Mariappan , J. , Shih , A. & Schrader , P.G. (2004) ' Use of scenario-based learning approach in teaching statics ', Proceedings of the 2004 American society for engineering education Annual Conference and Exposition, American society for engineering Education . Available at: file:///C:/Users/Aidata/Downloads/scenario-based-learning-approach-in-teaching-statics%20(2).pdf [accessed 28 December 2023].

Ministry of National Education Education (MoNE)]. (2017). Elementary mathematics 5–8. classes curriculum and guide. Ankara: Board of Education and Discipline.

Moralı, S. , Uğurel , I., Türnüklü , E. & Yeşildere, S. (2006). Pre-service mathematics teachers' views on proving . Kastamonu Education Journal, 14(1), 147- 160.

Nwabueze , K. K. (2006). technology class format versus traditional class format in undergraduate algebra _ technology , pedagogy oath Education , 15(1), 79-93.

Özsevgeç , LC & Kocadağ, Y. (2013). The effects of scenario-based learning approach on eliminating students' misconceptions about heredity. *Hacettepe University Faculty of Education Journal, 28* (3), 83-96.

Papadimitriou , A. (2012). A Scenario-Based learning of electrical circuits . *Journal of Education oath Practice , 3(7),* 27-45.

Pektezel , B. (2017). *The use of drama in teaching history subjects in the social studies course: an action research* [Unpublished master's thesis]. Uşak University Institute of Social Sciences, Uşak.

Singh, S.K. , Pervak , MP, Onyshchenko , VI, & Yehorenko , O.S. (2023). Scenario-Based learning during emergency medicine module . I Всеукраїнський forum молодих вчених з міжнародною участю . 22–23 червня 2023 року , м. Odessa : збірка тез . [Електронне видання]. – Одеса : ОНМедУ , 2023. – 104 с. ISBN 978-966-443-125-2.

Sorin , R. (2013). Scenario-Based learning : transforming tertiary teaching oath learning _ of proceedings of The 8th Qs -Apple Conference, Bali (71-81). Available at: https:// core.ac .uk/download/pdf/303762722.pdf [accessed 28 December 2023].

Söğümlü , Ü. (2009). *Language The effectiveness of the scenario-based learning approach in teaching knowledge: an example of word types* [Unpublished master's thesis]. Sakarya University, Institute of Social Sciences, Sakarya.

Taneri , A. (2018). Scenario-Based case study method oath the functionality of the section called " from production to consumption " from the perspective of primary school students _ *Asian Journal of Education and Training, 4* (1), 56-61 .

Temur, D. & Turan, H. (2018). The effect of scenario-based learning approach on third grade primary school students' ability to solve addition and subtraction problems. Kocaeli University Education Journal, 1(2), 72-84.

Tol, H. Y. (2018). *Maths Explaining the historical developments of the subjects with the scenario-based learning method will help students* [*Unpublished* master's thesis]. Necmettin Erbakan University Institute of Educational Sciences, Konya.

Tupe , N. (2015). Multimedia scenario based learning program for enhancing the english language efficiency among primary school students. *International Journal of Instruction, 8* (2), 125-138.

Uner, I. (2009). *The effect of learning with cartoons on students' achievement and attitude levels in primary schools* [Unpublished master's thesis]. Marmara University Institute of Science and Technology, Istanbul.

Williams, S. & Molina , D. (1998). Algebra : what all students can learn . the nature oath algebra in the k-14 curriculum . Proceedings of a national symposium . *National Council of Teachers of Mathematics , Mathematical Sciences Board of Education , & National Research Council (US).* Washington, DC : National academies Press .

Yaman, H. & Suğumlü , Ü. (2009). The effectiveness of the scenario-based learning approach in teaching grammar: an example of word types. *Language Journal,* 144.

Yeniceli, E. (2016). *Scenario The effect of based teaching on success in science course and attitude towards the course* [Unpublished master's thesis]. Gazi University Institute of Educational Sciences, Ankara.

Yıldırım, A. and Şimşek, H. , (2018). *Qualitative research methods in the social sciences* . Seckin Publishing.