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Research Article

Comparison of mathematics self-efficacy perceptions of gifted and normally developing primary school students

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Abstract

This study aims to compare the mathematics self-efficacy perceptions of gifted and normally developing primary school students according to different variables (gender, grade, preferred course, being a gifted/normally developing student). For this purpose, the study was designed according to the survey design. The study group consisted of 63 gifted Science and Art Center students and 89 primary school students (3-4th grade). The study data were collected with the "Mathematics Self-Efficacy Perception Scale" and "Personal Information Form." Before analyzing the obtained data, the normality condition of the data was checked. An Independent Sample t-test was used to analyze the data that met the normality condition. In contrast, the Man Whitney U test was used to analyze the data that did not meet the normality condition. As a result of the data analysis, according to the class variable, the mathematics self-efficacy of 3rd-grade normally developing students differed significantly in the attitude sub-dimension and the whole scale compared to 4th-grade students. 3rd grade gifted students showed a significant difference in mathematics self-efficacy only in the motivation sub-dimension compared to their peers with normal development. According to the gender variable, it was determined that the math self-efficacy of gifted male students differed significantly in the motivation sub-dimension compared to their normally developing male peers. According to the variable of favorite course, it was seen that gifted students who preferred mathematics courses in the first place differed significantly in the attitude sub-dimension of mathematics self-efficacy and the whole scale compared to gifted students who did not prefer mathematics courses in the first place. The mathematics self-efficacy of normally developing students who preferred the mathematics course in the first place differed significantly in all three sub-dimensions (attitude, motivation, and practice) and the whole scale compared to their peers who did not prefer the course in the first place. The mathematics self-efficacy of gifted students who chose other courses in the first place differed significantly in attitude and motivation sub-dimensions compared to normally developing students who preferred other courses in the first place. According to the variable of being a gifted/normally developing student, the mathematics self-efficacy perceptions of gifted primary school (3-4th grade) students differed significantly only in the motivation sub-dimension compared to their normally developing peers.

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Introduction

Mathematics, which is vital as a branch of science and essential in explaining and interpreting the world we live in, is an

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abstract concept with a systematic structure and includes sequential images and generalization principles (Cotton, 2008; Utanir, 2008). Since abstract concepts are difficult to learn, students have prejudices against this course; students experience fears such as "I can not do it," "I can not succeed," and "I can not overcome" (Ashcraft & Faust, 1994; Demir, 2017). One of the main reasons mathematics is complicated for students is due to the teachers who used to teach under strict discipline or the education system based more on memorization today. In addition, giving importance to students' cognitive development in mathematics and not giving the necessary extent to their affective development can also be shown among the main reasons for these fears (Utley, 2004; Yenilmez & Uygan, 2010). However, if teachers conduct their lessons with activities that emphasize the fun and relaxing aspect of mathematics, they can prevent this thought from occurring. Mathematics, which is taught systematically from the preschool period to the last years of primary school, contributes to students' scientific life and systematically produces solutions to the problems encountered in daily life. Due to this importance, the importance of teaching mathematics, which is emphasized at every level and in every subject from primary school to higher education programs, is increasing day by day, and it is noted that the necessary importance should be given to the affective characteristics of students as well as their cognitive characteristics (Alakoc, 2003; Altun, 2005; Yenilmez & Uygan, 2010).

Some essential concepts affect the affective characteristics of individuals towards a situation or event (Baypinar & Tarim, 2019). Among these concepts, self-efficacy appears before educators as an essential concept that affects individuals' behaviors. The concept of self-efficacy as the belief that a job can be done means the ability of a person to do a certain activity or to get a certain result (Zulkosky, 2009). Self-efficacy is the perception that individuals have the potential to perform the actions they need to fulfill specific tasks within a particular plan. Bandura (1986) defines the concept of self-efficacy as "a person's self-perception of whether an activity can be done or not." Unlu (2021) described this concept as "one's judgment about one's capacity to accomplish a task." Based on these definitions, self-efficacy is "the perception or belief that individuals can fulfill the requirements of any field, profession, job or discipline (Karali & Cosanay, 2022). Observations on self-efficacy perception show that individuals who do not struggle with the difficulties encountered or who give up immediately due to the stress they experience are known to have low performance (Pajares, 2002). On the contrary, it is known that individuals with high self-efficacy perception do not give up immediately in the face of the difficulties they face and try to overcome these difficulties by struggling (Pajares, 1996). Bandura (1986) stated that individuals with high self-efficacy perception finalize their performance in all conditions. While self-efficacy perception is a factor that positively affects individuals' performances, it also has positive effects on affective skills that play an important role in individuals' lives. Individuals with high self-efficacy can set high goals for themselves to accomplish a task and be motivated to fulfill this task without depending on external factors. Individuals with high self-efficacy perception who provide high-level motivation can improve their affective skills along with their cognitive processes (Akbas & Celikkaleli, 2006).

Although the definitions reveal that self-efficacy positively affects individuals' performance, it should not be forgotten that this concept is not the only factor for success. Because self-efficacy perception is not the performance of an individual in accomplishing a task but their belief that they can do this task (Spicer, 2004). Therefore, individuals with high self-efficacy make an evaluation in the face of the problems they face, decide whether they will complete this task successfully or not, and take action. As a result of this decision, they concentrate on the task for a long time and struggle without giving up until they complete the task successfully (Schunk, 1989). In addition, the abilities and interests of individuals cause this concept to be more prominent. For example, a student who has a talent for mathematics or likes this subject has a high mathematics self-efficacy perception. On the other hand, it is known that individuals with high mathematics self-efficacy perception are more successful in overcoming the obstacles they face to succeed. On the other hand, low self-efficacy perceptions of individuals with prejudice towards mathematics cause low achievement (Bandura, 1986; Margolis & McCabe, 2006). These explanations show that self-efficacy is an essential concept in mathematics education.

Mathematics self-efficacy perception is the students' general self-efficacy in mathematics-related subjects and their belief that they can overcome mathematical problems (Ozturk, 2017). The curriculum states, " *Students will be willing*

to learn mathematics. They believe that they can learn mathematics. They enjoy dealing with mathematics. They trust themselves in mathematics." The inclusion of these learning outcomes, such as "Students should have competence not only in cognitive skills but also in affective skills in mathematics", comes to the forefront (Ministry of National Education [MoNE], 2018). Therefore, besides having sufficient cognitive skills, students should also have practical skills in achieving the mathematics course outcomes. For example, suppose a student knows how to solve a mathematical problem but thinks that he/she cannot solve the problem or lacks self-confidence in problem-solving, he/she may not be able to solve the problem successfully. However, if they have the confidence that they can solve the problem and are willing to solve it, they can successfully solve the problem by trying to solve it.

Mathematics self-efficacy is an individual's perception of their abilities to complete the mathematics-related performance process (Ural et al., 2008). As a determinant of mathematics performance, mathematics self-efficacy perception enables students to approach complex problems calmly and logically, be aware of their mathematical skills, and believe that they will succeed. Students with high self-efficacy perception concentrate their attention on learning the subject during the lesson. In contrast, students with low mathematics self-efficacy are timid towards mathematics, think they cannot solve problems, are skeptical about the solution, and may fail (Ozturk & Sahin, 2015). In addition, students with high math self-efficacy have high academic achievement and low anxiety levels (Hackett & Betz, 1989; Schunk, 1989; Stevens et al., 2004).

Students' mathematics self-efficacy has been shown to increase in lessons that create positive student experiences (Hall & Ponton, 2005). Therefore, to improve students' mathematics self-efficacy perceptions, teachers should use fun methods in mathematics lessons, allocate enough time to students, and give students the necessary feedback (Gedik & Aykac, 2017). However, while teachers give more space to practices to improve students' cognitive performances in classroom activities, they offer less space to activities that develop affective skills, which are extremely important in developing well-rounded students (Karali & Cosanay, 2022). In this case, it should not be forgotten that the effort and determination of teachers to analyze the subject to be taught and to bring students to the desired goal have essential effects on students' self-efficacy (Pajares & Urdan, 2006). Teachers' inclusion of practical activities that motivate students and help them gain self-confidence by considering multidimensional students in their lesson plans affects students' better understanding of mathematical concepts, application skills, and attitudes toward learning (Ordonez-Feliciano, 2009). Crezo (2004) interviewed students from different schools and different grades who experienced problem-based learning and found that problem-based learning changed students' learning processes and increased their motivation. This method enabled students to learn more about the subject and created excitement about participating in the lesson. The creative drama method positively affected students' self-efficacy perceptions towards mathematics courses (Gedik & Aykac, 2017). It was determined that the scenario-based learning method significantly impacted self-efficacy perception (Tol & Cenberci, 2019).

Although teachers fulfill their duties by using different methods to improve students' mathematics self-efficacy perceptions, not all students' mathematics self-efficacy perceptions may be at the desired level. This is because the self-efficacy of students with different mental competencies and emotional characteristics (gifted students, normally developing students, and students with learning disabilities) may differ even though they are studying in the same class.

In the literature, there are studies in which students' self-efficacy at the primary school level was examined according to different variables (Altuntas 2021; Medikoglu, 2020), and the relationship between academic achievement, attitude, and mathematics self-efficacy was examined together (Akyurek Tay et al., 2020; Cavdar & Sahan, 2019). At the middle school level, studies were conducted to reveal the effects of different variables (Adal & Yavuz, 2017; Doruk et al., 2016; Haciomeroglu & Elmali-Erdem, 2021; Ozturk & Kurtulus, 2017; Sevgi & Yakisikli, 2020) and different practices (creative drama, scenario-based learning) on self-efficacy (Gedik & Aykac, 2017; Sevgi & Zihar, 2020). The effect of scenario-based education on mathematics self-efficacy perception at the ninth-grade level of high school was examined (Tol & Cenberci, 2019). The mathematics self-efficacy levels of senior high school students were analyzed according to some variables (Tasdemir, 2012). Studies were conducted on the self-efficacy perceptions of pre-service primary school teachers towards mathematics teaching (Arseven et al., 2015) and the effect of

mathematics self-efficacy perception of pre-service mathematics teachers on anxiety toward teaching mathematics (Ural, 2014). In addition, a study was conducted to reveal the effect of mathematics self-efficacy resources of gifted middle school students on their mathematics anxiety (Yurt & Kurnaz, 2015). Studies have shown that self-efficacy affects mathematics achievement, and students with high self-efficacy have high mathematics achievement (Callahan, 1971; Medikoglu, 2020; Nicolaidou & Philippou, 2003; Pajares & Miller, 1994). However, no study was found in which the mathematics self-efficacy of both gifted and normally developing students was examined in terms of different variables at the primary school level.

It is known that gifted students are highly capable of understanding and reasoning about mathematical ideas (Miller, 1990). These individuals are eager to study, highly motivated, and creative (Mingus & Grassl, 1999). These students, who can be flexible in mathematical operations and thinking, can produce alternative solutions by activating their skills of organizing and associating data in solving a problem. They can easily comprehend mathematical structures, generalizations, and abstract expressions; they can test the truth or falsity of a structure. In addition, they are curious about learning mathematical ideas; they are faster and more competent in comprehension and application than their peers (Erdogan & Erben, 2018; Miller, 1990; Sriraman, 2005; Wieczerkowski et al., 2000; Young & Worrell, 2018). Therefore, it is thought that this study comparing the mathematics self-efficacy of gifted and normally developing primary school students will significantly contribute to the literature.

It was observed that the studies in the literature addressed the effects of different practices according to other variables within groups or between groups. For example, among personal experiences, social persuasions, vicarious experiences, and psychological states that constitute the self-efficacy resources of gifted middle school students, only personal experiences had a significant effect on gifted students' mathematics anxiety (Yurt & Kurnaz, 2015). It was found that there was a positive relationship between mathematics anxiety and mathematics self-efficacy perceptions of 3rd and 4th-grade normally developing students (Altuntas, 2021). It was observed that there was a significant difference between the academic self-efficacy of gifted students and the academic self-efficacy of normally developing students studying in the 4th grade of primary school. It was determined that the academic self-efficacy perceptions of gifted students in Turkish, Mathematics, Science, and Social Studies courses were relatively high compared to normally developing students (Aksoy, 2014). The general emotional intelligence, managing emotions, and motivation levels of gifted students were higher than those of normally developing students (Yildiz, 2019). Therefore, this study will significantly contribute to the literature by comparing the mathematics self-efficacy perceptions of gifted and normally developing primary school students. At the end of the study, it is thought that the results obtained from the comparison of mathematics self-efficacy of gifted and normally developing primary school students will guide teachers of primary school and gifted students to consider individual differences when planning mathematics activities with their students and to differentiate and enrich mathematics activities.

Problem of Study

In this study, in which the mathematics self-efficacy perceptions of gifted and normally developing primary school students (grades 3-4) are compared, the following questions will be answered:

- Is there a statistically significant difference between the mathematics self-efficacy perceptions of gifted and normally developing primary school students according to the grade variable?
- Is there a statistically significant difference between the mathematics self-efficacy perceptions of gifted and normally developing primary school students according to the gender variable?
- Is there a statistically significant difference between the mathematics self-efficacy perceptions of gifted and normally developing primary school students according to their favorite course variable?
- Is there a statistically significant difference between the mathematics self-efficacy perceptions of gifted and normally developing primary school students according to the variable of being a gifted/normally developing student?

Method

Research Model

Relational survey design was used in the study. Relational survey design aims to reveal the current situation or the level of change between two or more variables (Fraenkel et al., 2012; Karasar, 2013). In the study, the effect of gender, grade, favorite course, and being a gifted/normally developing student variables on elementary school students' mathematics self-efficacy was examined.

Participants

The study, which was conducted to compare the mathematics self-efficacy of gifted and normally developing primary school (3-4th grade) students, was conducted by including 152 primary school students studying in Afyonkarahisar province in the study using convenience sampling. The convenience sampling method, one of the purposive sampling methods, is a sampling method preferred to speed up the research (Ekiz, 2009). The research was conducted by reaching gifted students at the Science and Art Center, where the researcher worked in the fall semester of 2022-2023. For the primary school normally developing students, the researcher collected the data by reaching the primary school students studying in their immediate vicinity. Information about gifted and normally developing primary school students is shown in Table 1.

Table 1. Demographic information of gifted and normally developing students

Status	Variable	Gifted		Normally Developing	
		f	%	f	%
Group	Gifted/Normal	63	41.45	89	58.55
Grade	3rd grade	30	19.74	44	28.95
	4th grade	33	21.71	45	29.60
Gender	Female	28	18.42	38	25
	Male	35	23.02	51	33.56
Popular lesson	Mathematics	28	18.42	29	19.08
	Other	35	23.02	60	39.48

When Table 1 is examined, 41.45% of the students participating in the study were in the gifted group, and 58.55% were in the normally developing group. 19.74% of the 3rd-grade students were in the gifted group, and 28.95% were in the normally developing group. While 21.71% of 4th-grade students were gifted, 29.60% were in the normally developing students group. 18.42% of the female students, were gifted, and 25% were normally developing. While 23.02% of the male students were gifted, 33.56% were in the normally developing students group. In addition, 18.42% of the students, who liked the math course at first place, were gifted, and 19.08% were normally developing students. 23.02% of the students, who liked other courses, were gifted, and 39.48% were in the normally developing students group.

Data Collection Tools

The "Mathematics Self-Efficacy Perception Scale" developed by Karalı and Cosanay (2022) for primary school students was used to compare the mathematics self-efficacy perceptions of gifted and normally developing primary school students (3-4th grade). The scale consists of 13 questions and includes three sub-dimensions (Attitude, Motivation, and Application). Cronbach's Alpha reliability coefficient was calculated as 0.84 in the reliability analysis of the scale prepared in a triple Likert style. The Cronbach Alpha reliability coefficient calculated for this study was 0.72. The "Personal Information Form" prepared by the researcher was used to collect personal information about the students' grades, gender, favorite course preferences, and the schools they attended.

Analysis of Data

The data subjected to analysis in the study were collected in the first week of the second semester of the 2022-2023 academic year. The researcher collected the scale from primary school students in 20 minutes with the support of classroom teachers. Before data collection, the researcher made the necessary explanations and told the students that this form contained no evaluation elements. Whether the mathematics self-efficacy perceptions of primary school

students differed statistically significantly according to the variables of grade, gender, favorite course, and being a gifted/normally developing student was examined with the help of the SPSS 26 program. Before starting the analysis, the normality of the data set was checked. The data related to the procedures performed to check the normality condition are shown in Table 2.

Table 2. Normality test results of the data

Status	Variable	n	Min	Max	*M*	sd	Kolmogorov-Smirnov		
							Statistic	df	Sig.
Gifted	3rd-grade	30	24	38	32.36	3.72	0.104	30	0.200*
	4th-grade	33	21	38	31.39	5.16	0.148	33	0.066*
Normally Developing	3rd-grade	44	22	37	32.5	3.61	0.129	44	0.065*
	4th-grade	45	22	38	30.75	4.27	0.119	45	0.121*
Gifted	Female	28	23	38	31.46	4.28	0.134	28	0.200*
	Male	35	21	38	32.17	4.75	0.135	35	0.104*
Normally Developing	Female	38	24	37	32.26	3.51	0.146	38	0.041
	Male	51	22	38	31.13	4.35	0.123	51	0.054*
Gifted	Mathematics	28	23	38	33.89	3.80	0.146	28	0.134*
	Other	35	21	38	30.22	4.44	0.116	35	0.200*
Normally Developing	Mathematics	29	28	38	34.51	2.78	0.220	29	0.001
	Other	60	22	37	30.21	3.80	0.144	60	0.003
Gifted/Normally Developing	Gifted	63	21	38	31.81	4.52	0.126	63	0.014
	Normally Developing	89	22	38	31.61	4.03	0.108	89	0.012

Table 2 shows the results of the Kolmogorov-Smirnov test for the variables of class, gender, favorite course, and being a gifted/normally developing student. According to the results of the Kolmogorov-Smirnov test, when the p (Sig.) value of the data obtained is larger than 0.05, it can be said that the data are normally distributed (Can, 2019). According to the grade, gender, and favorite subject (for gifted students) variables of primary school students, the data are above the desired values ($p>0.05$). In the variables of gender and favorite course (for normally developing students) and being a gifted/normally developing student, the data are below the desired values ($p<0.05$). In this case, since the data according to grade level, gender, and favorite course (for gifted students) showed normal distribution, the Independent Sample t-test, one of the parametric tests, was used. Since the data according to gender, favorite course, and being a gifted/normally developing student variable (for normally developing students) did not show normal distribution, the Man Whitney U test was used, one of the non-parametric tests.

Results

Findings According to Grade Variable

The results of the independent sample t-test conducted to determine whether the mathematics self-efficacy perceptions of gifted and normally developing students differed according to their grade level are shown in Table 3.

Table 3. Mathematics self-efficacy perceptions of gifted and normally developing students by grade level

Group	Dimension	Grade	n	*M*	sd	df	t	*p*
Gifted	Attitude	3rd-grade	30	10.23	2.86	61	-0.478	0.635
		4th-grade	33	10.54	2.31			
	Motivation	3rd-grade	30	11.20	1.27	61	1.777	0.081
		4th-grade	33	10.33	2.38			
	Application	3rd-grade	30	10.93	1.01	61	1.144	0.257
		4th-grade	33	10.51	1.75			
	Total	3rd-grade	30	32.36	3.72	61	0.849	0.399
		4th-grade	33	31.39	5.16			
Normally Developing	Attitude	3rd-grade	44	11.38	1.46	87	2.483	0.015*
		4th-grade	45	10.46	1.98			
	Motivation	3rd-grade	44	10.25	1.51	87	0.784	0.435
		4th-grade	45	9.97	1.75			
	Application	3rd-grade	44	10.86	1.39	87	1.621	0.109
		4th-grade	45	10.31	1.79			
	Total	3rd-grade	44	32.5	3.61	87	2.075	0.041*
		4th-grade	45	30.75	4.27			

According to Table 3, it is seen that gifted students' mathematics self-efficacy perceptions of the three sub-dimensions and the whole scale do not differ significantly according to the grade variable [t(61)=-0.478; t(61)=1.777, t(61)=1.144; t(61)=0.849, p>0.05]. The mathematics self-efficacy perceptions of normally developing students in the attitude sub-dimension and the whole scale differed significantly according to the grade variable [t(87)=2.483; t(87)=2.075, p<0.05]. There is no significant difference in motivation and application sub-dimensions according to the grade variable [t(87)=0.784; t(87)=1.621, p>0.05].

The results of the Man Whitney U test conducted to reveal whether the mathematics self-efficacy perceptions of gifted and normally developing students differed according to the grade variable are shown in Table 4.

Table 4. Mathematics self-efficacy perceptions of gifted and normally developing students by grade level

Grade	Dimension	Students	n	Rank Average	Rank Total	*U*	*p*
3rd grade	Attitude	Gifted	30	32.58	977.5	512.5	0.098
		Normally Developing	44	40.85	1797.5		
	Motivation	Gifted	30	46.23	1387	398	0.003*
		Normally Developing	44	31.55	1388		
	Application	Gifted	30	36.93	1108	643	0.843
		Normally Developing	44	37.89	1667		
	Total	Gifted	30	36.68	1100.5	635.5	0.786
		Normally Developing	44	38.06	1674.5		
4th grade	Attitude	Gifted	33	39.92	1317.5	728.5	0.886
		Normally Developing	45	39.19	1763.5		
	Motivation	Gifted	33	43.88	1448	598	0.127
		Normally Developing	45	36.29	1633		
	Application	Gifted	33	41.03	1354	692	0.595
		Normally Developing	45	38.38	1727		
	Total	Gifted	33	41.52	1370	676	0.500
		Normally Developing	45	38.02	1711		

According to Table 4, while the mathematics self-efficacy perceptions of gifted and normally developing students differed significantly only in the motivation sub-dimension at the 3rd-grade level (U=398, p<0.05), there was no significant difference in the other sub-dimensions and the whole scale (U=512.5; U=643; U=635.5, p>0.05). At the

4th-grade level, the mathematics self-efficacy perceptions of gifted and normally developing students did not differ significantly (U=728.5; U=598; U=692; U=676, p>0.05).

Findings According to Gender Variable

The results of the independent sample t-test conducted to reveal whether gifted students' mathematics self-efficacy perceptions differed according to their gender are shown in Table 5.

Table 5. Mathematics self-efficacy perceptions of gifted students by gender

Group	Dimension	Gender	n	*M*	sd	df	t	*p*
Gifted	Attitude	Female	28	10.21	2.55	61	0.500	0.619
		Male	35	10.54	2.61			
	Motivation	Female	28	10.75	1.64	61	-0.014	0.989
		Male	35	10.74	2.21			
	Application	Female	28	10.50	1.47	61	1.048	0.299
		Male	35	10.88	1.43			
	Total	Female	28	31.46	4.28	61	0.613	0.542
		Male	35	32.17	4.75			

According to Table 5, it is seen that gifted students' mathematics self-efficacy perceptions of the three sub-dimensions and the whole scale do not differ significantly according to gender variable [t(61)=0.500; t(61)=-0.014, t(61)=1.048, t(61)=0.613, p>0.05].

The results of the Man Whitney U test conducted to reveal whether the mathematics self-efficacy perceptions of normally developing students differed according to their gender are shown in Table 6.

Table 6. Mathematics self-efficacy perceptions of normally developing students by gender

Group	Dimension	Gender	n	Rank Average	Rank Total	*U*	*p*
Normally Developing	Attitude	Female	38	43.69	2228	902	0.572
		Male	51	46.76	1777		
	Motivation	Female	38	44.06	2247	921	0.684
		Male	51	46.26	1758		
	Application	Female	38	41.66	2124.5	798.5	0.139
		Male	51	49.49	1880.5		
	Total	Female	38	42.33	2159	833	0.257
		Male	51	48.58	1846		

According to Table 6, it is seen that the mathematics self-efficacy perceptions of normally developing students belonging to the three sub-dimensions and the whole scale do not differ significantly according to the gender variable (U=902; U=921; U=798.5; U=833, p>0.05).

The results of the Man Whitney U test conducted to reveal whether the mathematics self-efficacy perceptions of gifted and normally developing students differed according to the gender variable are shown in Table 7.

Table 7. Mathematics self-efficacy perceptions of gifted and normally developing students by gender

Gender	Dimension	Students	n	Rank Average	Rank Total	*U*	*p*
Female	Attitude	Gifted	28	29.34	821.5	415.5	0.126
		Normally Developing	38	36.57	1389.5		
	Motivation	Gifted	28	37.86	1060	410	0.098
		Normally Developing	38	30.29	1151		
	Application	Gifted	28	30.14	844	438	0.200
		Normally Developing	38	35.97	1367		
	Total	Gifted	28	31.20	873.5	467.5	0.401
		Normally Developing	38	35.20	1337.5		
Male	Attitude	Gifted	35	42.39	1483.5	853.5	0.728
		Normally Developing	51	44.26	2257.5		
	Motivation	Gifted	35	52.20	1827	588	0.005*
		Normally Developing	51	37.53	1914		
	Application	Gifted	35	47.96	1678.5	736.5	0.150
		Normally Developing	51	40.44	2062.5		
	Total	Gifted	35	47.39	1658.5	756.5	0.230
		Normally Developing	51	40.83	2082.5		

According to Table 7, the mathematics self-efficacy perceptions of gifted and normally developing female students did not differ significantly in all three sub-dimensions and the whole scale (U=415.5; U=410; U=438; U=467.5, p>0.05). While the mathematics self-efficacy perceptions of gifted male students differed significantly only in the motivation sub-dimension (U=588, p<0.05), there was no significant difference in the other sub-dimensions and in the whole scale (U=853.5; U=736.5; U=756.5, p>0.05).

Findings According to Favorite Course Variable

The results of the independent sample t-test conducted to reveal whether gifted students' mathematics self-efficacy perceptions differed according to the mathematics course chosen in the first place are shown in Table 8.

Table 8. Mathematics self-efficacy perceptions of gifted students according to their mathematics preferences

Group	Dimension	Course	n	*M*	sd	df	t	p
Gifted	Attitude	Mathematics	28	12.07	1.78	61	5.653	0.000*
		Other	35	9.05	2.32			
	Motivation	Mathematics	28	11	1.41	61	0.915	0.364
		Other	35	10.54	2.31			
	Application	Mathematics	28	10.82	1.56	61	0.520	0.605
		Other	35	10.62	1.37			
	Total	Mathematics	28	33.89	3.80	61	3.462	0.001*
		Other	35	30.22	4.44			

According to Table 8, gifted students' mathematics self-efficacy perceptions of the attitude sub-dimension and the whole scale differ significantly according to the mathematics course selected in the first place [t(61)=5.653; t(61)=3.462, p<0.05]. There is no significant difference in the sub-dimensions of motivation and application according to the mathematics course selected in the first order [t(61)=0.915; t(61)=0.520, p>0.05].

The results of the Man Whitney U test conducted to reveal whether the mathematics self-efficacy perceptions of normally developing students differed according to the mathematics course chosen in the first place are shown in Table 9.

Table 9. Mathematics self-efficacy perceptions of normally developing students according to their mathematics preferences

Group	Dimension	Course	n	Rank Average	Rank Total	*U*	*p*
Normally Developing	Attitude	Mathematics	29	67.86	1968	207	0.000*
		Other	60	33.95	2037		
	Motivation	Mathematics	29	57.02	1653.5	521.5	0.002*
		Other	60	39.19	2351.5		
	Application	Mathematics	29	54.05	1567.5	607.5	0.016*
		Other	60	40.63	2437.5		
	Total	Mathematics	29	64.17	1861	314	0.000*
		Other	60	35.73	2144		

According to Table 9, the mathematics self-efficacy perceptions of normally developing students regarding the three sub-dimensions of the scale and the whole differ significantly according to the mathematics course variable chosen at first place (U=207; U=521.5; U=607.5; U =314, p<0.05).

The results of the Man Whitney U test to reveal whether the mathematics self-efficacy perceptions of gifted and normally developing students differed according to the favorite course variable are shown in Table 10.

Table 10. Mathematics self-efficacy perceptions of gifted and normally developing students according to favorite course

Favorite Course	Dimension	Students	n	Rank Average	Rank Total	*U*	*p*
Mathematics	Attitude	Gifted	28	27.52	770.5	364.5	0.494
		Normally Developing	29	30.43	882.5		
	Motivation	Gifted	28	30.54	855	363	0.458
		Normally Developing	29	27.52	798		
	Application	Gifted	28	27.91	781.5	375.5	0.593
		Normally Developing	29	30.05	871.5		
	Total	Gifted	28	28.43	796	390	0.797
		Normally Developing	29	29.55	857		
Other Courses	Attitude	Gifted	35	38.87	1360.5	730.5	0.013*
		Normally Developing	60	53.33	3199.5		
	Motivation	Gifted	35	58.37	2043	687	0.004*
		Normally Developing	60	41.95	2517		
	Application	Gifted	35	49.81	1743.5	986.5	0.613
		Normally Developing	60	46.94	2816.5		
	Total	Gifted	35	47.70	1669.5	1039.5	0.935
		Normally Developing	60	48.18	2890.5		

Table 10 shows that the mathematics self-efficacy perceptions of gifted students who like mathematics and normally developing students do not differ significantly (U=364.5; U=363; U=375.5; U=390, p>0.05). While the mathematics self-efficacy perceptions of gifted students who liked other courses and normally developing students differed significantly in the attitude and motivation sub-dimension (U=730.5; U=687, p<0.05), there was no significant difference in the application sub-dimension and the whole scale (U=986.5; U=1039.5, p>0.05).

Findings According to the Variable of Being a Gifted/Normally Developing Student

The results of the Man Whitney U t-test conducted to determine whether the mathematics self-efficacy perceptions of gifted and normally developing students differed between the groups are shown in Table 11.

Table 11. Mathematics self-efficacy perceptions of gifted and normally developing students

Dimension	Students	n	Rank Average	Rank Total	*U*	*p*
Attitude	Gifted	63	71.48	4503.5	2487.5	0.232
	Normally Developing	89	80.05	7124.5		
Motivation	Gifted	63	89.42	5633.5	1989.5	0.001*
	Normally Developing	89	67.35	5994.5		
Application	Gifted	63	77.63	4891	2732	0.779
	Normally Developing	89	75.70	6737		
Total	Gifted	63	78.21	4927.5	2695.5	0.685
	Normally Developing	89	75.29	6700.5		

According to Table 11, the mathematics self-efficacy perceptions of gifted and normally developing students differed significantly in the motivation sub-dimension (U=1989.5, p<0.05). There is no significant difference between the groups in attitude and application sub-dimensions and the whole scale (U=2487.5; U=2732; U=2695.5, p>0.05).

Conclusion and Discussion

While there was no significant difference between the mathematics self-efficacy perceptions of gifted 3rd and 4th-grade students, the mathematics self-efficacy of 3rd-grade normally developing students differed significantly in favor of 3rd-grade students in the attitude sub-dimension and the whole scale compared to 4th-grade students. According to this result, while the grade variable was not effective on gifted students, it was effective on primary school normally developing students (in the attitude sub-dimension and the whole scale). The fact that the mathematics self-efficacy perception of secondary school students differed according to the grade level variable supports the results of our study (Ozturk & Kurtulus, 2017). According to this result, it can be evaluated that the grade variable is an effective variable on students' mathematics self-efficacy in primary school normally developing students. Medikoglu's (2020) findings that self-efficacy perception decreases as the grade level increases and that mathematics anxiety decreases and interest and motivation towards mathematics increase as mathematics self-efficacy perception increases to support the results of our study. However, Uzar (2010) found that mathematics self-efficacy perception did not differ according to grade level. The decrease in students' mathematics self-efficacy as the grade level increases in elementary school may be because students who face a high course load may get bored in the face of intensive lessons or be unable to conduct enjoyable lessons. The increase in grade level leads to a rise in the number of abstract subjects and thus causes students to experience learning difficulties. However, providing creative learning environments that will make abstract and complex mathematical concepts in students' minds concrete and engaging can prevent this problem (Tanriseven Uredi et al., 2008).

While the mathematics self-efficacy of 3rd-grade gifted students showed a significant difference compared to normally developing 3rd-grade students only in the motivation sub-dimension, it was determined that the mathematics self-efficacy of 4th-grade gifted and normally developing students did not differ. According to this result, it can be said that the mathematics self-efficacy of gifted 3rd-grade students in the motivation sub-dimension is higher than that of their peers. It can be seen as an expected result that the motivation of gifted students, who have high independent movement skills and are very eager to study, is high. Because these students are curious about learning mathematical ideas, they can exhibit high motivation to start and sustain a task (Erdogan & Erben, 2018; Miller, 1990). However, the fact that there was no significant difference between gifted students and normally developing students at the 4th-grade level can be considered an unexpected result. This is because gifted students receive differentiated education according to their interests and abilities outside of school. The fact that these educations provide concrete experiences, use materials, and require high attention suggests that they will positively affect the mathematics self-efficacy perceptions of these students.

It was determined that mathematics self-efficacy perception did not differ significantly between gifted male and female students and normally developing male and female students. In addition, while there was no significant difference between gifted female students and normally developing female students, it was determined that the

mathematics self-efficacy of gifted male students differed significantly in the motivation sub-dimension compared to normally developing male students. According to this result, it can be said that gifted male students are more motivated than their peers with normal development. Medikoglu (2020) determined that gender was an essential variable in determining mathematics self-efficacy in a study conducted with primary school students, which supports the result of the study. However, some studies show that gender is not an important variable in determining the mathematics self-efficacy of secondary school students (Haciomeroglu & Elmali-Erdem, 2021; Sevgi & Yakisikli, 2020).

According to the variable of favorite course, it was seen that the mathematics self-efficacy of gifted students who preferred the mathematics course in the first place differed significantly in the attitude sub-dimension and the whole scale compared to the gifted students who did not prefer the mathematics course in the first place. The mathematics self-efficacy of the normally developing students who preferred the mathematics course in the first place differed significantly in all three sub-dimensions and the whole scale compared to their peers who did not prefer the mathematics course in the first place. According to these results, the mathematics course chosen in the first place affects the mathematics self-efficacy of gifted students in the attitude sub-dimension and the whole scale. In contrast, it affects the mathematics self-efficacy of normally developing students in all three sub-dimensions and the whole scale. The fact that there is a significant relationship between students' attitudes towards mathematics and mathematics self-efficacy perception level supports the results of our study (Cavdar & Sahan, 2019). Related studies have shown that students with positive attitudes toward mathematics have a positive academic achievement (Bas et al., 2021; Razzouk, 2011). Therefore, it is considered that students who love mathematics will also have high mathematics self-efficacy perceptions based on the fact that students will be successful in affectionately loved courses. However, the mathematics self-efficacy of gifted students did not differ significantly, only in motivation and application sub-dimensions. This result may be because gifted students receive process-based and application-oriented education. Therefore, the fact that most gifted students receive this education may have caused them not to make a significant difference in the application sub-dimension. In addition, based on an item in the motivation sub-dimension of gifted students, the fact that most gifted students marked the statement "I can easily understand the mathematics lesson" as "always" may have led to this result. In addition, the fact that these students need less external force to start and continue their activities may be shown as the reason why their mathematics self-efficacy did not differ significantly in the motivation and application sub-dimensions.

It was determined that mathematics self-efficacy perception did not differ between gifted students who preferred mathematics in the first place and normally developing students who preferred mathematics in the first place. However, there is a significant difference in the attitude and motivation sub-dimensions of gifted students who prefer other courses in the first place compared to normally developing students who prefer other courses in the first place. According to these results, it can be said that even if gifted students prefer other courses first, their mathematics self-efficacy is higher in the attitude and motivation sub-dimensions compared to their peers because gifted students are more motivated and interested in mathematics lessons. After all, they are more capable of understanding and reasoning mathematical ideas than other students (Ataman, 2004; Caglar, 2004; Mingus & Grassl, 1999; Tuttle & Becker, 1980).

According to the results of comparing gifted and normally developing students between the groups, gifted primary school (Grade 3-4) students' mathematics self-efficacy perceptions differed significantly only in the motivation sub-dimension compared to their normally developing peers (Grade 3-4). There is no significant difference between the two groups in other sub-dimensions. According to this result, it can be said that gifted students are more motivated towards mathematics lessons than their peers. The result that self-efficacy perception showed a statistically significant difference according to school type supports this study result (Tasdemir, 2012). The fact that gifted students are highly motivated to carry out their tasks from the beginning to the end may have been effective in this result (Sternberg & Davidson, 2005). Although these students sometimes experience motivation and anxiety problems due to the high expectations and perfectionist structures of their parents and environment, they do not want to be successful because their close environment wants them to be successful but because they want to be successful. These students, who strive

to achieve their goals by concentrating their thoughts on an extensive range of areas, aim with the desire for superior learning without expecting to be encouraged and appreciated (Caglar, 2004).

Recommendations

The study was conducted with gifted and normally developing students at the 3rd and 4th-grade primary school levels. Future studies can be performed in which gifted and normally developing middle school or higher levels students are included in the study group. These studies can use different variables (parental education status, mathematics achievement, etc.). Experimental studies can be conducted to measure the development in mathematics self-efficacy perceptions of gifted and normally developing students. Studies can be planned to reveal which group these variables are more effective. In order to generalize the results obtained, research can be conducted with study groups with more students.

Limitations of Study

This research is limited to the quantitative research method and the survey design conducted with this method. It is limited to 63 students studying at the Science and Art Center in Afyonkarahisar province at the 3rd and 4th-grade level in the 2022-2023 academic year and 89 primary school students studying at a primary school in that province. The data obtained are limited to the interview form consisting of four variables and a scale of 13 items created for this study.

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