Primary school students’ mathematics motivation and anxieties*

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Abstract

Mathematics is necessary to enable children to gain the knowledge and skills required for daily life, it teaches them how to solve a problem, enables them to gain ways of thinking and prepares them for the future. The prejudice developed towards mathematics affects the students’ perceptions related to the mentioned course. The students’ low motivation and high anxiety concerning mathematics are among the most important problems encountered. This research was conducted with students in the third and fourth grades in primary schools in Istanbul province to examine their mathematics motivation and anxieties. It was concluded that students’ mathematics motivation was at a medium level and their mathematics anxieties were very low and there were no differences according to gender. Mathematics motivations among fourth grade students were higher than that of third grade students. It can be recommended that classroom teachers should prepare the environment in which they can introduce the entertaining world of mathematics to students.

Keywords: Primary school student, mathematics, mathematics motivation and mathematics anxiety.

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1. Introduction

As a basic branch of science, mathematics is an essential area for scientific studies, technological developments and community life. A mathematics course is one of the tools required for bringing children the knowledge and skills necessary in life, teaching them problem solving, the thinking skills included in a problem-solving approach and preparing them for the future (Yildirim, Tarim & Ilfazoglu, 2006). Learning mathematics is a must because it is a field that develops the behaviours required for solving various problems encountered in our daily lives, such as logical thinking and the ability to communicate, recognising relationships and the ability to make generalisations, generalise the relationships recognition and develop creative thinking, mental independence and the ability to think through problems (Aksu, 1991). While mathematics has such importance in every aspect of life, unfortunately, many people are reluctant when it comes to mathematics, and they talk about how difficult mathematics is as a branch of science (Kanbir, 2009).

In learning, cognitive characteristics are as effective as affective characteristics. One of these affective properties is motivation. While many reasons can be given regarding students’ failures in mathematics courses, their achievements in this course are dependent on their willingness to immerse themselves in a mathematics course. This case is associated with students’ motivations (Bozkurt & Bircan, 2015). Endler, Rey and Butz (2012) define motivation as ‘an intrinsic situation that governs behaviour, prompting an individual by giving energy to him/her towards the objectives and that is a part of the learning process’. Accordingly, motivation is one of the most important components affecting learning. According to the results of studies conducted in the field of motivation, students’ beliefs in themselves and extrinsic elements, such as the learning environment and rewards are effective in motivation (Palmer, 2005; Unal & Bursali, 2013).

For this reason, students’ motivation is frequently discussed as extrinsic motivation and intrinsic motivation (Afzal, Ali & Khan, 2010). In extrinsic motivation, what prompts an individual is not the learning process itself but reinforcers that are not directly associated with the process. In intrinsic motivation, what prompts an individual includes needs originating from the individual themselves, such as interest and curiosity (Akbaa &Aktas, 2005). Praise of a student by a teacher, due to his/her high marks, can be given as an example of extrinsic motivation. Curiosity, a need for knowledge, a desire for becoming competent and a desire for developments can be given intrinsic motivation (Selcuk, 2000). Control is in the individual’s grasp with intrinsic motivation while control is in the environment in extrinsic motivation (Yildiz, 2010). Mathematics motivation, on contrary, is in the students’ eagerness to learn and active participation in activities related to mathematics (Ispir, Ay & Saygi, 2011). Teachers should refrain from attitudes and behaviours that may prevent students becoming motivated during the learning process, and they should take steps towards motivating students (Balantekin & Oksal, 2014). For this reason, students who are motivated to learn will actively participate in classes and repeat the information, associate information with previous information and ask questions. A person who is motivated does activities on the subject in his spare time, conducts studies and looks for different ways of learning (Schunk, 2009).

Another affective characteristic is the concept of ‘anxiety’. Especially, if there is mathematics involved, it is enough for students just to hear the name of the course to feel anxiety. Studies have revealed that a medium level of anxiety positively affects success in courses; however, excessive levels of anxiety impede learning and students fail. A failed student becomes more anxious and, as he/she gets anxious, he/she fails again. As long as this cycle continues, in the long term, this leads people to avoid mathematics, become distant and it even affects their choice of profession. As can be seen, anxiety is both the reason and the outcome of achievement (Deringol, 2017).

Prejudice developed against mathematics in the community also affects students’ perceptions of the course. This is especially true of the anxiety that students feel against mathematics and is among the leading problems in the field of mathematics (Bai, 2011; Cates &Rhymer, 2003; Ozdemir &Gul, 2011; Yenilmez, 2010). It was determined that a student of mathematics anxiety of adverse effects
related to the use of mathematics (D’Ailly & Bergening, 1992; Erktin, Donmez & Ozel, 2006; Scarpello, 2005). Mathematics anxiety in students usually emerges with various negative experiences they have at school (Harper & Daane, 1998; Jackson & Leffingwell, 1999). It can be seen that students’ negative experiences in mathematics courses during primary school creates mathematics anxiety; this state of anxiety leads to avoiding mathematics until the secondary school period (Ashcraft, 2002; Royse & Rompf, 1992), at the same time, they also lead to the trend in decreasing confidence in mathematics skills (Bursal & Pazarokas, 2006). Insecurity and low motivation also lead to students’ avoidance of mathematics and their failures in further educational stages, starting from primary education (Zakaria & Nordin, 2008). As can be seen, mathematics motivation and anxiety are related. In this study conducted on the basis of this idea, the objective is to analyse primary school students’ mathematics motivations and anxieties in terms of different variables. Sub-problems determined for this purpose are as follows:

i. How are students’ mathematics motivation and anxiety levels?

ii. Do students’ mathematics motivation and anxieties vary according to gender?

iii. Do students’ mathematics motivations and anxieties vary according to their grade level?

iv. Do students’ mathematics motivations and anxieties vary according to their state of liking the mathematics course?

v. Is there a relationship between students’ mathematics motivations, anxieties and their grades?

2. Method

2.1. Research design

This study was designed as a quantitative survey model towards comparing primary school students’ motivation and mathematics anxieties. It was decided to carry out the present research, which was intended to examine the current situations of primary school students, in a survey model. As stated by Karasar (2005), the survey model’s aim is ‘describing a situation existing in the past or recently as it is’.

2.2. Participants

The research sample consists of a total of 202 third and fourth grade students attending primary schools in Istanbul province (Turkey) and selected with a simple random sampling method. As basic operation concepts are intensively given in the first 2 years of primary school, the sample of the research was chosen from the students in the third and fourth grades, the last two grades of primary school. Distribution of students in the study group based on gender and grade levels is presented below.

<table>
<thead>
<tr>
<th>Grade level</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
</tr>
<tr>
<td>Third grade</td>
<td>55</td>
<td>53.9</td>
<td>47</td>
</tr>
<tr>
<td>Fourth grade</td>
<td>53</td>
<td>53.0</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>53.5</td>
<td>94</td>
</tr>
</tbody>
</table>

The sample consists of a total of 202 primary school students including 108 (53.5%) girls and 94 (46.5%) boys. In all, 102 (50.5%) of the students attend the third grade; 100 (49.5%) of them attend the fourth grade.
2.3. Data collection tools

‘Personal Information Form’, ‘Mathematics Course Motivation Scale for Primary School Third and Fourth Grade Students’ and ‘Mathematics Anxiety Scale for Primary School Students’ were used as data collection tools in the research.

Personal Information Form: the first data collection tool is ‘Personal Information Form’ developed by the researcher. Personal Information Form consists of demographic information about students and their answers to the question of whether they like mathematics or not.

Mathematics Course Motivation Scale for Primary School Third and Fourth Grade Students: This scale was developed by Balantekin and Oksal (2014) and consists of 14 items and includes 3 sub-dimensions. These dimensions include ‘Extrinsic Motivation’, ‘Demotivation’ and ‘Intrinsic Motivation’. As the scale was prepared in five-point Likert type, it is scored in the form of Strongly Agree (five), Agree (four), Neither Disagree nor Agree (three), Disagree (two), Completely Disagree (one). There are no negative items in the scale. Accordingly, as the ‘Extrinsic Motivation’ and ‘Demotivation’ factors consist of 5 items, minimum 5 and maximum 25 points can be obtained from these factors. As the ‘Intrinsic Motivation’ consists of 4 items, minimum 4 and maximum 20 points can be obtained (Balantekin & Oksal, 2014). Internal consistency coefficient of the scale was found as 0.78; also found as 0.76 in this research.

Mathematics Anxiety Scale for Primary School Students: this scale was developed by Bindak (2005) and consists of a total of 10 items. This scale was prepared in five-point Likert type, and these options include ‘always, often, sometimes, hardly ever and never’. Positive items for anxiety were scored in the form of 5-4-3-2-1, and negative items for anxiety were scored in the form of 1-2-3-4-5. One of the items included in the scale is negative items for anxiety. Thus, an anxiety score was included in each score. High score showed high level of mathematics anxiety. Internal consistency coefficient of the scale was found as 0.84, also found as 0.87 in this research.

2.4. Data analysis

Data collection tools were applied to primary school students on a mathematics course. Volunteering was taken as a basis for participation in the study. The papers, which had imperfect information, were excluded from the study, the ones who completely filled in the measuring tools were included in the study and their data entries were made. Statistical solutions of measurement tools were conducted using SPSS 16.0. Before starting the analyses, the Kolmogorov–Smirnov test was conducted in normality testing of data distributions and, at the same time, Skewness–Kurtosis values of scores were evaluated. As the significance value was found to be lower than 0.05 according to Kolmogorov–Smirnov test results, and the skewness coefficient was between +2.0 and −2.0 according to George and Mallery (2010), it was observed that data showed normal distribution, and parametric tests were used. Accordingly, in data analysis, independent sample t test, one-way analysis of variance and Pearson moment correlation technique were applied and calculated.

3. Findings

Findings obtained, which are related to Third and Fourth grade primary school students’ mathematics motivations and mathematics anxieties based on variables, are presented below. Findings belonging to the first problem are presented.

Table 2. Mathematics motivation and anxiety score averages of the sample

<table>
<thead>
<tr>
<th>Scales</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic motivation</td>
<td>202</td>
<td>2.66</td>
<td>1.16</td>
</tr>
<tr>
<td>Demotivation</td>
<td>202</td>
<td>1.84</td>
<td>1.00</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>202</td>
<td>4.19</td>
<td>0.88</td>
</tr>
</tbody>
</table>
To determine students’ levels as per their scores obtained from the scales, the range width of the scale was calculated by using the ‘array width/number of groups to be applied’ \((4/5 = 0.80)\) formula (Tekin, 1993). Arithmetic average ranges of the scale were determined as 1.00–1.79 ‘Very Low’, 1.80–2.59 ‘Low’, 2.60–3.39 ‘Medium’ 3.40–4.19 ‘High’ and 4.20–5.00 ‘Very High’. Accordingly, as can be seen in Table 2, students achieved medium levels of scores from the ‘Extrinsic Motivation’ dimension, low levels of scores from the ‘Demotivation’ dimension and high levels of scores from the ‘Intrinsic Motivation’ dimension. Analysing the scale in general, it can be said that students’ mathematics motivations are at a medium level, and their mathematics anxieties are very low.

Findings belonging to the second problem are presented below.

Table 3. Independent sample t test results of mathematics motivation and anxiety scores according to the gender variable of the sample

<table>
<thead>
<tr>
<th>Scales</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic motivation</td>
<td>Girl</td>
<td>108</td>
<td>13.65</td>
<td>5.77</td>
<td>0.929</td>
<td>0.354</td>
</tr>
<tr>
<td></td>
<td>Boy</td>
<td>94</td>
<td>12.89</td>
<td>5.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demotivation</td>
<td>Girl</td>
<td>108</td>
<td>9.78</td>
<td>5.12</td>
<td>1.754</td>
<td>0.081</td>
</tr>
<tr>
<td></td>
<td>Boy</td>
<td>94</td>
<td>8.55</td>
<td>4.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Girl</td>
<td>108</td>
<td>16.41</td>
<td>3.56</td>
<td>−1.489</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>Boy</td>
<td>94</td>
<td>17.15</td>
<td>3.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics motivation</td>
<td>Girl</td>
<td>108</td>
<td>39.86</td>
<td>9.57</td>
<td>0.932</td>
<td>0.353</td>
</tr>
<tr>
<td></td>
<td>Boy</td>
<td>94</td>
<td>38.60</td>
<td>9.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics anxiety</td>
<td>Girl</td>
<td>108</td>
<td>18.00</td>
<td>7.84</td>
<td>0.245</td>
<td>0.807</td>
</tr>
<tr>
<td></td>
<td>Boy</td>
<td>94</td>
<td>17.71</td>
<td>8.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No significant differences were found between genders in the sample and ‘Mathematics Course Motivation Scale for Primary School Third and Fourth Grade Students’ ‘Extrinsic Motivation’ \((t = 0.929; p > 0.05)\), ‘Demotivation’ \((t = 1.754; p > 0.05)\), ‘Intrinsic Motivation’ \((t = −1.489; p > 0.05)\) dimensions and scale total \((t = 0.932; p > 0.05)\) scores. Also, there are no significant differences among ‘Mathematics Anxiety Scale for Primary School Students’ \((t = 0.245; p > 0.05)\) total scores.

The findings of the third, fourth and fifth problems are presented below.

Table 4. Independent sample t test results of mathematics motivation and anxiety scores as per grade level in the sample

<table>
<thead>
<tr>
<th>Scales</th>
<th>Grade</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic motivation</td>
<td>Third</td>
<td>102</td>
<td>14.05</td>
<td>6.39</td>
<td>1.875</td>
<td>0.062</td>
</tr>
<tr>
<td></td>
<td>Fourth</td>
<td>100</td>
<td>12.53</td>
<td>5.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demotivation</td>
<td>Third</td>
<td>102</td>
<td>9.45</td>
<td>4.72</td>
<td>0.681</td>
<td>0.497</td>
</tr>
<tr>
<td></td>
<td>Fourth</td>
<td>100</td>
<td>8.97</td>
<td>5.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Third</td>
<td>102</td>
<td>17.14</td>
<td>3.56</td>
<td>1.562</td>
<td>0.120</td>
</tr>
<tr>
<td></td>
<td>Fourth</td>
<td>100</td>
<td>16.37</td>
<td>3.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics motivation</td>
<td>Third</td>
<td>102</td>
<td>40.65</td>
<td>10.03</td>
<td>2.092</td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td>Fourth</td>
<td>100</td>
<td>37.87</td>
<td>8.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics anxiety</td>
<td>Third</td>
<td>102</td>
<td>18.12</td>
<td>8.41</td>
<td>0.450</td>
<td>0.653</td>
</tr>
<tr>
<td></td>
<td>Fourth</td>
<td>100</td>
<td>17.60</td>
<td>8.22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No significant differences were found between grades included in the sample and ‘Mathematics Course Motivation Scale for Primary School Third and Fourth Grade Students’ scale total \((t = 2.092; p < 0.05)\) scores. Accordingly; mathematics motivations of fourth grade students are higher than those of third grade students.
third grade students. There was no significant difference between the grades of the students in the sample and ‘Mathematics Course Motivation Scale for Primary School Third and Fourth Grade Students’ ‘Extrinsic Motivation’ (t = 1.875; p > 0.05), ‘Demotivation’ (t = 0.681; p > 0.05), ‘Intrinsic Motivation’ (t = 1.562; p > 0.05) dimension scores. Also, there are no significant differences among ‘Mathematics Anxiety Scale for Primary School Students’ (t = 0.450; p > 0.05) total scores.

Table 5. Independent sample t test results of mathematics motivation and anxiety scores from the answers given to the question ‘Do you like mathematics?’ in the sample

<table>
<thead>
<tr>
<th>Scales</th>
<th>Answer</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic motivation</td>
<td>Yes</td>
<td>169</td>
<td>13.05</td>
<td>5.97</td>
<td>-1.375</td>
<td>0.171</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33</td>
<td>14.57</td>
<td>4.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demotivation</td>
<td>Yes</td>
<td>169</td>
<td>8.59</td>
<td>4.71</td>
<td>-4.100</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33</td>
<td>12.36</td>
<td>5.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Yes</td>
<td>169</td>
<td>17.43</td>
<td>3.11</td>
<td>6.775</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33</td>
<td>13.30</td>
<td>3.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics motivation</td>
<td>Yes</td>
<td>169</td>
<td>39.08</td>
<td>9.38</td>
<td>-0.634</td>
<td>0.527</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33</td>
<td>40.24</td>
<td>10.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics anxiety</td>
<td>Yes</td>
<td>169</td>
<td>16.50</td>
<td>7.44</td>
<td>-5.644</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33</td>
<td>24.81</td>
<td>9.09</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No significant differences were found between ‘Mathematics Course Motivation Scale for Third and Fourth Grade Primary School Students’ ‘Demotivation’ (t = -4.100; p < 0.01) and ‘Intrinsic Motivation’ (t = 6.775; p < 0.01) dimension scores and answers given to the question ‘Do you like mathematics?’ Accordingly, in the ‘Demotivation’ dimension, scores among students who did not like mathematics were higher than those of students who liked mathematics; in Intrinsic Motivation’ dimension, scores among students who liked mathematics were higher than those of students who did not like mathematics. No significant differences were found between ‘Mathematics Course Motivation Scale for Third and Fourth Grade Primary School Students’ ‘Extrinsic Motivation’ (t = -1.375; p > 0.05) dimension, scale total (t = -0.634; p > 0.05) scores and answers given to the question ‘Do you like mathematics?’. There was significance between ‘Mathematics Anxiety Scale for Primary School Students’ (t = -5.644; p < .01) total scores and answers to question ‘Do you like mathematics?’. Anxieties among students who answered ‘I like mathematics’ were relatively lower (Table 5).

Table 6. Pearson product moment correlation analysis results for mathematics motivation and anxiety scores with mathematics grades

<table>
<thead>
<tr>
<th>Scales</th>
<th>N</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics grades</td>
<td>202</td>
<td>-0.158</td>
<td>0.025</td>
</tr>
<tr>
<td>Extrinsic motivations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics grades</td>
<td>202</td>
<td>-0.130</td>
<td>0.065</td>
</tr>
<tr>
<td>Demotivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics grades</td>
<td>202</td>
<td>0.155</td>
<td>0.028</td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics grades</td>
<td>202</td>
<td>-0.107</td>
<td>0.129</td>
</tr>
<tr>
<td>Mathematics motivation scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics grades</td>
<td>202</td>
<td>-0.289</td>
<td>0.000</td>
</tr>
<tr>
<td>Mathematics anxiety scale</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Table 6, a negatively oriented significant relationship was determined between primary school students’ mathematics grades and ‘Extrinsic Motivation’ (r = -0.158; p < 0.05), ‘Mathematics Anxiety Scale for Primary School Students’ (r = -0.289; p.<.01) total scores; and a positively oriented significant relationship was found between students’ grades and ‘Intrinsic Motivation’ (r = 0.155; p < 0.05). There are no significant relationships between mathematics grades
4. Conclusion and discussion

Students’ academic achievements are affected by cognitive input behaviours and affective characteristics (Ilhan & Sunkur, 2012). It is known that cognitive input behaviours are open to change (Senemoglu, 2005), it is hard to notice affective characteristics and, unfortunately, it takes time to change these characteristics (Erden & Akman, 2011). Therefore, it is important to recognise students’ affective properties related to the learning–teaching process and related to the course at an early stage. Thus, if students’ affective features, which adversely affect their achievement, are detected at an early stage, it can be easier to take measures and even eliminate the problems (Ilhan & Sunkur, 2012). Therefore, similarity the result of this research, in which primary school students’ mathematics motivation and anxieties were determined, it can be seen that students achieved a medium of score from ‘Extrinsic Motivation’ and a low score from ‘Demotivation’, a high score from ‘Intrinsic Motivation’ and, considering the scale in general, it can be said that students have a medium level of mathematics motivation.

Students’ low scores in the demotivation dimension and their high score in the intrinsic motivation dimension can be explained as the fact that students’ motivation towards mathematics may be positive. In a study conducted by Dede and Argun (2004), similarly, it was concluded that students’ intrinsic motivations towards mathematics were relatively higher compared to their extrinsic motivations. Aktan (2012) also concluded that, while fifth grade primary school students’ mathematics motivations were over the medium level, their motivations were not very high. At the same time, it can be said that mathematics anxieties in the sample were very low.

In the research, primary school students’ mathematics motivations and anxieties did not create a difference based on their grade levels. Similarly, in the study conducted by Bozkurt and Bircan (2015), ‘Analysis of the Relationship between Primary Fifth Grade Students’ Math Motivation with Academic Achievement of Maths’, a difference was not found between students’ gender and their mathematics motivations. It was concluded that, in the many of the studies conducted, gender was not affective in mathematics motivation (Ayan, 2014; Budak, 2016). According to the results of many studies, no differences were found between anxiety and gender as is the case in this study (Cooper & Robinson, 1991; Dede & Dursun, 2008; Sakal, 2015; Sapma, 2013; Tasdemir, 2015; Tobias, 1991; Yetkin, 2017).

Mathematics motivations of fourth grade students were higher than those of third grade students in the research sample. In a study conducted by Alucdibi and Ekici (2012), it was concluded that students’ levels of motivation increased as the level of grade increased. Skinner and Belmont (1993) indicated that levels of motivation decreased passing from primary school to higher education, and students moved away from the learning process in time. In the sample, students’ mathematics anxieties did not vary according to the grade level variable. Results of some studies also show similarities with this finding (Aydogdu, 2017; Evren, 2010; Yenilmez & Ozbey, 2006).

Students were asked ‘Do you like the mathematics course?’ and, based on the answers given by the students, it was found that scores obtained from students who did not like mathematics were relatively higher in the ‘Demotivation’ dimension, and scores obtained by students who liked mathematics were relatively higher in the ‘Intrinsic Motivation’ dimension. As can be seen, whether they like mathematics also affects students’ motivation towards the course. In a study conducted by Tasdemir (2015), it was concluded that mathematics anxiety levels among students who liked mathematics were significantly lower compared to those of students who did not like mathematics. Similarly, results of many studies conducted with primary school students are in parallel with the results of this study (Baban, 2018; Peker & Senturk, 2012; Sakal, 2015; Sahin, 2008). Also, mathematics anxieties are lower among students who report that they like mathematics. Consequently, liking the mathematics course affects both motivation and anxieties. At this point, teachers have a great responsibility in ensuring that students like the
mathematics course. Classroom teachers should be able to arrange and apply activities that will make students like the mathematics course; they should care about personal differences; they should be able to show fun aspects of mathematics to students and apply various educational techniques to ensure that their students succeed.

The last result of the research is a determination of a negatively oriented relationship between primary school students’ mathematics grades and their extrinsic motivation, mathematics anxieties, and a positively oriented relationship between their grades and intrinsic motivation. There are no significant relationships between mathematics grades and scores from demotivation and total motivation. In extrinsic motivation, behaviour may end as soon as reinforcement ends. Individuals with intrinsic motivation are fully focused. Therefore, it can be said that intrinsic motivation is more effective in reaching and maintaining achievement (Gazioglu, 2013). Students with intrinsic objectives tend to have increased levels of intrinsic motivation when they face subjects in which they are interested, enjoy and subjects that will challenge them (Zimmerman, 2002). In many studies (Demir & Budak, 2016; Harackiewicz, Elliot, Carter, Lehto & Barron, 1997; Rawsthorne & Elliot, 1999), intrinsic motivation was emphasised to increase achievement. Significant relationships were found between the students’ mathematics scores and their motivations and anxiety. There are many studies that have concluded that achievement is associated with both mathematics anxiety and motivation (Aktan, 2012; Shores & Shannon, 2007; Stevens, Olivarez Jr., Lan & Tallent-Runnels, 2004; Yildirim, 2011).

Motivation is a variable closely associated with academic achievement (Awan, Noureen & Naz, 2011; Bobis, Anderson, Martin & Way, 2011; Budak, 2016; Jackson, 2002; Ma & Kishor, 1997; Middleton & Spanias, 1999; Shores & Shannon, 2007; Singh, Granville & Dika, 2002). At the same time, it can be said that mathematics anxiety is an important variable explaining students’ achievements in mathematics (Ramirez, Gunderson, Levine & Beilock, 2013; Suinn & Edwards, 1982). Students with a high level of mathematics anxiety will reach a lower level of mathematics achievement compared to students who have a low level of mathematics anxiety (Gazioglu, 2013). According to many studies, there is a negatively oriented relationship between students’ achievements in mathematics and their mathematics anxieties. In other words, many studies supported the finding that students with high levels of mathematics achievement have lower levels of mathematics anxiety or there is a negatively oriented significant relationship (Durmaz, 2012; Dursun & Bindak, 2011; Ilhan & Sunkur, 2012; Karimi & Venkatesan, 2009; Kutluca, Alpay & Kutluca, 2015; Lee & Stankov, 2013; Ma, 1999; Sherman & Wither, 2003; Tooke & Leonard, 1998; Wadlington & Wadlington, 2008; Wahid, Yusof & Razak, 2014).

Consequently, knowing students’ motivations towards mathematics in general and knowing students’ intrinsic and extrinsic motivations towards mathematics specifically will offer a good idea to teachers about how they can apply teaching (Dede & Argun, 2004). Students’ lack of belief in becoming successful lies at the base of their anxieties towards a mathematics course. On this subject, teachers have a responsibility to encourage students and make students believe in their success. To achieve this, teachers should determine the objectives of a subject explicitly, use various materials to make courses fun and keep students’ motivation high (Yenilmez & Ozbey, 2006).

The following recommendations can be made in line with the results of the study:

Classroom teachers should develop and apply effective activities in order to ensure that their students’ mathematics motivations are high and their anxieties are low. Also, teachers should prepare the environments in which they introduce the entertaining world of mathematics to the students. In line with the findings obtained in the study, the present study can be structured quantitatively or qualitatively, with different samples, by taking different variables into account. There were no differences by gender in the study. Accordingly, primary school students’ mathematics motivations and anxieties can be examined thoroughly by dealing with them in terms of gender. Longitudinal studies may be conducted to examine the effects of affective factors and observations by primary school students.
References


Durmaz, M. (2012). Identifying the relationships among the degrees of basic psychological needs satisfaction, motivation and mathematics anxiety of high school students (10th grade) (Master thesis). University of Abant Izzet Baysal, Bolu, Turkey.


Ilhan, M. & Sunkur, M. O. (2012). Math anxiety is the power to predict mathematical success of positive and negative perfectionism. Journal of Mersin University Faculty, 8(1), 178–188.


