PRESERVICE ELEMENTARY MATHEMATICS TEACHERS' LEVEL OF RELATING MATHEMATICAL CONCEPTS IN DAILY LIFE CONTEXTS

İLKÖĞRETİM MATEMATİK ÖĞRETMENİ ADAYLARININ MATEMATİĞİ GÜNLÜK YAŞAMLA İLİŞKİLENDİRME DÜZEYLERİ

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ABSTRACT: The purpose of this study was to investigate preservice elementary mathematics teachers' ability of relating mathematical concepts and daily life context. Two research questions were set; what is the preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context regarding to their education year and their Grade Point Average? and is there a relationship between preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context and their self efficacy towards mathematics? A survey research was designed with 194 preservice elementary mathematics teachers. A scale and its rubric were developed. Data analyses revealed that preservice mathematics teachers' level of relating mathematical concepts in daily life context is increased throughout their year of education. Furthermore all participants were found as efficacious towards mathematics and a correlation was captured between their self efficacy towards mathematics and level of relating mathematics in daily life context.

Keywords: mathematics education, mathematical concepts, mathematics in daily life, preservice mathematics teachers, self efficacy towards mathematics

ÖZET: Bu çalışmada ilköğretim matematik öğretmeni adaylarının matematiksel kavramlarla günlük yaşamı ilişkilendirme düzeyleri incelenmiştir. İlköğretim matematik öğretmeni adaylarının matematiksel kavramlarla günlük yaşamı ilişkilendirme düzeyinin belirlenip bu düzeylerinin okudukları yıla ve akademik ortalamaya göre incelenmesi ve bu matematiği günlük yaşamla ilişkilendirme düzeyi ile matematiğe karşı öz yeterlik arasında bir ilişki olup olmadığının ortaya konması araştırmanın iki problemidir. Çalışmaya 194 ilköğretim matematik öğretmeni adayı katılmıştır. Matematiksel kavramlar ve günlük yaşam arasındaki ilişkilendirmeyi ölçmek için araştırmacı tarafından bir ölçek ve bu ölçeği değerlendirmek için de dereceli puanlama anahtarı geliştirilmiştir. Analiz sonuçlarına göre, ilköğretim matematik öğretmeni adaylarının matematiksel kavramlar ile günlük yaşamı ilişkilendirme düzeylerinin okudukları öğretim yılına göre artış gösterdiği söylenebilir. Bunun yanısıra öğretmen adaylarının matematiğe karşı öz yeterlikleri ile matematiksel kavramları günlük yaşamla ilişkilendirme düzeyleri arasında bir ilişki bulunmuştur.

Anahtar Sözcükler: matematik eğitimi, matematiksel kavramlar, günlük hayatta matematik, matematik öğretmeni adayları, matematiğe karşı özyeterlik

1. INTRODUCTION

The term of "connected knowing" which establishes a rich network of association, is among the most durable and accessible forms of knowledge. Connected knowing is most easily generated when "knowledge is primarily being constructed in interaction with other people, in a process that depends on understanding others' experiences, perspectives, and reasoning, and incorporates this understanding into the individuals knowing and understanding" (Greeno, 2004). Lave and Wenger (1991) and Adler (1998) might refer to this "connected knowing" as the theory of situated learning, which claims that learning and understanding are most conducive when interacting and participating with others. Situated learning transpires in authentic activities in which problem-solving strategies are used for real life advancements (Brown, Collins, & Duguid, 1989). Lave and Wenger (1991) view schools that use traditional education programs as the institutions where knowledge is "decontextualized" and not transferable to real world working situations.

Advocates of situated learning claim that the only way to achieve meaningful learning, is to place it into social and physical context within which it can be used (Brown, Collins, & Duguid, 1989; Herrington & Oliver, 1999). Often, when enacting a curriculum within daily life context in the classroom, students work on projects in which they can share their knowledge and create a common

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discourse for understanding. This case can be called as `sociocultural practices` of the classroom environment refers to the community (Masingila, Davidenko, & Prus-Wisniowska, 1996). As Morris (2003) claimed that lessons might become more meaningful to students when they include a daily life context within the concepts for any particular topic. This spectacular view was deliberately supported by Skemp (1976) who gave emphasis on "relational understanding" over 20 years. Mousley (2004) followed his work and classified three kind of connections in mathematics. One of them was the linkage between mathematics in school and everyday life. He argued about the importance and necessity of establishing this link across the curriculum.

For every discipline, the curriculum designers should consider an important issue, which Wiggins and McTighe (1998) named "enduring understanding," that refers to "big ideas" that the curriculum designers want students to recall in a long time period. Enduring understanding was not described as skills, concepts or facts whereas it focused on processes or principles that can be implemented to new situations or can be utilized beyond one discipline (Wiggins & McTighe, 1998). Besides, Wiggins and McTighe (1998) suggested that enduring understanding should be at the heart of the subject and should engage students in "doing subjects". To illustrate this view, the topic of first degree equations with one unknown in the seventh grade mathematics curriculum can be chosen. Regarding this topic, lots of procedural knowledge needs to be performed for the seventh graders, such as; finding the unknowns in equations or the solution set of the equations. However, to get the essence of enduring understanding, the focus should not only be the procedural knowledge but also to make a link between daily life situations and equations or to utilize the first degree equations in new real life situations. Students can have a chance to discover the core knowledge of equation topic. Furthermore, with the help of the authentic assessment, students are shifted to active learners and constructors of knowledge (Wiggins, 1990). Hence, it can be argued that integrating concepts into daily life context can be an effective tool for the development of enduring understanding across a variety of disciplines.

An effective curriculum as defined in Principles and Standards for School Mathematics (NCTM, 2000) "is more than a collection of activities: it must be coherent and mathematical ideas should be linked" (NCTM, 2000, p. 14). NCTM describes two methods of curriculum integration; one which creates connections between mathematical concepts and one which connects mathematics to other disciplines. The latter integration links mathematics to real life, such as solving measurement problems presented in the context of health exercises or generating graphs that represent velocity and distance within the context of physics (NCTM, 2000). Furthermore within the standart of "Problem Solving", mathematics in daily life concept is also emphasized by solving problems that arise in the real world. Assigning students the tasks of comparing the value of products or services provided by two insurance, two cell-phone and two ambulance companies are examples used in this document to illustrate problem solving in contexts other than mathematics (NCTM, 2000). Another emphasis related to daily life mathematics was given in Principles and Standards for School Mathematics document in the standard of connections (NCTM, 2000). One of the standards for connections is defined as "all students from prekindergarten through grade 12 should recognize and apply mathematics in contexts outside of mathematics" (NCTM, 2000). Since thinking mathematically consists of seeking for connections of mathematics in daily life, the classroom activities including connected mathematics learning are appreciated in the document.

As we all know, Ministry of Education in Turkey implemented a powerful reform based mathematics curriculum through grades 1 to 8 in 2005 (MEB 2005a; 2005b). This attempt promotes mathematical learning environments that encourage the implementation of constructivist learning theory in which building relations with mathematics and daily life is crucial for meaningful mathematical learning. An attention was given to students' need for communicating their mathematical thinking within daily life context. Sample lesson activities and specified teacher roles were constructed as supportive to this perception. New methods for teaching and learning require education of teachers. There is a substantial evidence that effective mathematics teachers have a great impact on student' mathematical thinking and learning. In many research studies, it has been asserted that the preservice mathematics teachers need more than content knowledge to create this impact on their students, such as having positive attitudes towards teaching and mathematics, valuing conceptual

learning in mathematics, possessing high metacognition for learning (Kelly, 2001; Lovery, 2000; Tirosh, 2000). Hence in order to meet students with daily life problem solving contexts in mathematics classrooms, firstly preservice teachers need to be encountered have a comprehend view about it (Nunes, Schliemann & Carraher, 1993).

In the undergraduate mathematics education program in Turkey there are many possibilities in the courses dealing with mathematics in daily life. Preservice elementary mathematics teachers are given an opportunity to realize mathematics application in daily life and to make a rich connection between mathematical concepts and daily life context in their method courses, instructional technology and material developments course, and some elective courses. In this study it was aimed to see how they can relate mathematics and daily life.

1.1. Related Research Studies

During the course of this related research studies part, it should be mentioned that few studies have been conducted specifically to ascertain the relationship between mathematics and daily life for students or preservice mathematics teachers. Firstly one research study carried out with preservice mathematics teachers took place and then studies related with students were presented.

Koirala and Bowman (2003) focused on the preservice teachers' perceptions of mathematics in daily life context which is related to science. The integrated instruction considering mathematics and its implementation in real life was implemented during participants' method courses. Thematic mathematics topic were chosen to engage students in conceptual learning. Qualitative data was gathered from thirty-five middle school preservice teachers' course materials, reflective journals, field notes, observations, and interviews. According to the results of the study, all preservice teachers appreciated this kind of instruction and valued the necessity of using it in their future classrooms. Additionally, study participants found that mathematics concepts were more meaningful when they presented within a daily life context. It was also reported that the preservice teachers recognized some topics in mathematics, such as positive integers, rarely used in daily life.

Carraher-Nunes, Carraher, and Schliemann (1985) studied on the distinctions among street and school mathematics. They conducted a research study with 5 working youngsters aged from 9 to 11. They responded 99 questions on the formal mathematics test and 63 questions on the informal test in which mathematical concepts were embedded in daily life context. The results specified that participants' performance on mathematical problems related to daily life context in informal test was higher than the scores on formal test. Moreover during the interviews participants denoted that concrete situations in daily life helped them to solve mathematical problems in formal test.

The purpose of Barab's (1999) study was to "ecologize instruction" which means eradication of all abstract concepts in mathematics, and instead, the introduction of authentic, real world contexts. The participants were 400 Hispanic and African-American inner-city students from elementary to high school. She defined this mode of instruction as introducing contents in a context consistent with students' daily life outside the classroom. With this in mind, the units of this study were integrated in hopes to better motivate the students. To illustrate this, in a unit titled "Students' Rights Unit", students were asked to create a bill of rights that reflects the beliefs and values of all the students in the school. Throughout the course of this particular unit, participants learned percentages and graphs intrinsic to the theme. The students also learned about latitude, longitude, and scale from the personal and historical map unit in which they were required to design a map of their city. Observations and interviews were conducted regularly. It was claimed that participants demonstrated an improvement in performance. They were more motivated to learn and participated in the classroom discussions.

Guberman (2004) tried to seek students' out-of-school mathematics activities. There were 49 first, second, and third grade students coming from Latin America and Korea. All the participants and their parents were interviewed at their home. Participants were asked to solve 8 arithmetic problems including out-of-school mathematics context, like shopping or dealing with money. The researcher found that participants engaged in out-of-school mathematics activities, particularly on the task of

shopping with real money. It was concluded that mathematics activities outside of school have a crucial impact on mathematical knowledge that students have and bring to the mathematics classroom.

The relationship between mathematics achievement and awareness of daily life mathematics was examined for seventh grade students by Erturan (2007). A questionnaire was administered to participants to determine their awareness of daily life mathematics. An achievement test was used as another data collection instrument. In addition to these instruments, clinical interviews were conducted with seven participants. As a result, a significant relation between these two instruments was reported, and also it was pointed out that the participants noticed the mathematical concepts in daily life however they could not transfer them to daily life situations.

Yenilmez and Uysal (2007) investigated the primary students' level of connecting mathematical concepts and symbols in daily life with respect to demographic variables, such as; gender, grade, mathematical success, grade level, preschool education, and mathematics attitudes. 325 students from fourth, fifth, and sixth grades were involved in the study. Two instruments, mathematics and daily life test and demographic questionnaire were administered to the participants. The results showed that the fourth graders got significantly higher scores from the test comparing with other groups. Moreover, it can be detected that there is no significant difference between the groups regarding their gender and preschool education.

A good deal of important studies has been conducted in mathematics in daily life context. The most relevant ones were cited in this study. As the literature confirms, making connection mathematics in daily life context have the potential power to make mathematical learning better. However, during the literature review the researcher found no research study about the preservice mathematics teachers' ability level of making a connection between daily life and mathematical concepts. This study might fill this gap.

1.2. Purpose of the Study

The purpose of this study was to determine the preservice elementary mathematics teachers' level of relating mathematics and daily life context with respect to their education year, Grade Point Average (GPA), and self efficacy towards mathematics. Education year, GPA, and self efficacy towards mathematics were selected as related variables with making connection with mathematical concepts and daily life contexts. As the education year of preservice elementary mathematics teachers increases, they might be better in making such relations since they enroll more mathematics education courses. In addition to education year, GPA was selected since it was considered that high achievers might perform in connecting mathematics with daily life better than low achievers. Lastly self efficacy of preservice mathematics teachers towards mathematics was considered a dimension of their ability of relating mathematics and daily life contexts since it is directly linked to perceptions of preservice teachers' accomplishment of a task (Bandura, 1977).

1.3. Research Questions

The research questions guiding this study are;

1. What is the preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context regarding to their education year and their Grade Point Average (GPA)?

2. Is there a relationship between preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context and their self efficacy towards mathematics?

2. METHOD

2.1. Research design

A survey research design was chosen to be appropriate for this study. Due to the fundamental aim of survey research describing the features of the group it includes asking questions about a certain topic to a large group of participants (Fraenkel & Wallen, 1996).

2.2 Participants

Data were collected from a convenience sample of all students in the division of elementary mathematics education in one of the biggest state university in Ankara. All preservice elementary mathematics teachers consented to participate in the study yielding the total sample of 194 participants (144 female, 50 male). Out of 194, 57 freshmen, 48 sophomores, 45 juniors, 44 seniors were surveyed for this study.

2.3 Instruments

Two instruments namely Mathematics in Daily-life Context Scale (MDCS) and Self-Efficacy towards Mathematics Scale (SEMS) were administered in this study.

2.3.1. Development of Mathematics in Daily-life Context Scale (MDCS) and its Rubric

A major obstacle in undertaking a study of relationship between mathematics and daily life context is the difficulty of measuring it. Since no appropriate scale or test was found for this study the researcher decided to develop it. Initial mathematics concepts and the daily life contexts related with them were written with the goal that they should reflect a strong relationship with each other. The relationships were supported in the national elementary mathematics curriculum document (MEB, 2005b). In MDCS the participants were asked to imagine that they are mathematics teachers and at the beginning of their mathematics lesson they want to introduce a daily life context with mathematical concept embedded in it. The concept and related context were given in two different columns in the scale and the participants were required to establish a relationship between two and write it down to the third column. The selected mathematical concepts were integers, exponential numbers, line, circle, inequality, algebraic statements, equation, number patterns, perimeter, area, volume, mean, standard deviation, pie graph, dependent event. These concepts were chosen from five different learning field (numbers, algebra, geometry, measurement, probability and statistics) of mathematics curriculum. The daily life contexts were earth surface, animal world, soccer game, festival, law, relations, balance, child plays, farm life, buildings, pharmacy, blood types, students' height, elections, global warming, respectively. The participants were required to make a relationship between the given mathematical concept and daily life context and write this in the nearby cell. The format of the scale was illustrated as follows;

Table 1: Format and Sample Items of MDCS

Number	Context	Concept	Example of relationship
1	Animal world	Exponential numbers	
2	Soccer game	Line	
3	Law	Inequalities	
4	…	…	

From Table 1, it can be observed that participants see mathematical concept and related daily life context together in the same row, and are asked to write their example of relationship.

In addition to the scale a five-point rubric was designed to standardize the scoring of the scale. To score the students' responses to each item in MDCS, five-point rubric was used. The highest point of 5 indicated a complete relationship between the given mathematical concept and daily life context whereas the lowest point of 0 was given for irrelevant or no responses (Lane, 1993).

This scale and rubric were then submitted to three mathematics educators who were apprised of the purpose of the scale and who provided their opinions regarding the face validity and understandability of scale items. The number of the items was reduced to 15 from 20, some slight modifications were made in wording of the items, and format of the scale with three columns called *context, concept,* and *example of relationship* was completed by taking into account experts' opinions. One of the experts suggested giving only the mathematical concept not with the related daily life context together and the participants would find the daily life context by themselves. However the

other three including the researcher did not agree with this idea since it was aimed to measure whether participants can make a connection with the given mathematical concept and daily life context.

A pilot study for MDCS was carried out with eight mathematics education students. The given time for completing the MDCS was 40 minutes however, they completed the scale 20 minutes later. The opinions regarding to scale were taken from them. They mentioned that the complete time should be increased to one hour. Besides they struggled a confusion in three items so these three items were excluded from the scale. Hence it became a scale including 12 items and the completion time is one hour. The minimum and maximum possible scores from the scale items are 0 and 60 points, respectively. The internal consistency of MDCS was estimated by means of Cronbach alpha coefficient, with the result of .79.

2.3.2. Self-Efficacy towards Mathematics Scale (SEMS)

Another scale for assessing participants' self-efficacy towards mathematics, SEMS developed by Umay (2001) was administered. It included 12 items regarding to mathematics self efficacy statements in general. Umay (2001) determined that SEMS includes three dimensions that are mathematics identity perception, awareness of behavior about mathematics, ability to convert mathematics to the life skills. A five-point Likert type of scale-response format with five possible responses: "always", "frequently", "sometimes", "rarely", and "never" were used in this scale. Marking in the appropriate place located near the statements describing the possible choices, indicates the answer. In the scoring procedure, a choice of "always" was scored as 5 point, "never" as 1 point for positive items whereas a choice of "always" was scored as 1 point, "never" as 5 point for negative items. This scale could be completed approximately in 10 minutes. The published reliability estimate of the scale was reported to be .88 by Cronbach alpha coefficient. By using the same coeeficient the reliability of the scale was found as .82 in this study.

2.4. Procedure

The researcher familiar to the participants, as an instructor at the same university with them visited their classes and delivered information about this research. Participants were free to opt out of involving in this study and were given an opportunity asking questions about this study. Their questions primarily focused on requesting being informed about the results of the study. During the administration of the scales the participants were asked to read the context and concept carefully and try their best to make a connection between them, and give their honest answer. They completed the scales during a regular course period. Sessions lasted approximately one hour. They were assisted only if they had difficulty reading the words or phrases on the scale. No feedback was given regarding the accuracy of their works during all scales' administration.

After the administration, the scales were given to two mathematics educators and two elementary school mathematics teachers for scoring using the rubric. Including researcher five field experts scored each item on each scale separately without knowing the education year of participants. For the analyses, the mean of those scorings were calculated. All the statistical analyses were carried out by using SPSS 16.0.

3. FINDINGS OF THE STUDY

In this part, findings of the study were given with respect to research questions.

It was aimed to find out preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context regarding to their education year and their GPA in the first research question. Descriptive statistics collected on the data to identify means and standard deviations of the scores from MDCS for their education years were summarized in Table 2.

Table 2: Descriptive Statistics Related to the Scores from MDCS for Education Years

Education year	N	Mean	Std. deviation	Maximum	Minimum
Freshmen (1)	57	24,4	6,6	37	11
Sophomores (2)	48	28	7,3	46	14
Juniors (3)	45	41,4	6,7	45	15
Seniors (4)	44	51	11	60	22
Total	194	36,2	9,6	60	11

From Table 2, it can be said that the mean score of the whole group is 36,2 which can be accounted as high. Among all participants seniors got the highest score on MDCS, juniors followed them with the mean score of 41,4, and the mean score of sophomores was 28. Freshmen got the lowest mean score of 24,4. When the mean differences were calculated, it can be concluded that there is a difference between the mean scores with respect to education year of participants. Seniors have higher mean score when compared with the other three groups, and juniors have also higher mean score when compared with sophomores and freshmen whereas no difference was found between the mean scores of sophomores and freshmen. Furthermore no differences was detected between the mean scores from MDCS with respect to GPA of the participants. Therefore it can be mentioned that GPA had no effect on preservice elementary mathematics teachers' level of relating mathematical concepts in daily life context. The mean and standard deviations of each item in MDCS can be observed from Table 3.

Table 3: The Mean and Standard Deviations of Each Item in MDCS.

Items	Mean	Std. deviation
1	2,46	1,46
2	2,46	1,8
3	2,94	1,3
4	3,03	1,19
5	2,79	1,22
6	1,60	1,5
7	1,90	1,76
8	2,73	1,76
9	2,56	1,3
10	1,22	1,54
11	2,99	1,23
12	3,60	1,3

Among 12 items on MDCS, the tenth item related to *mean* got the lowest mean score and the last item related to *probability* got the highest mean score. The mean of all items was found as 2,52 which indicated average score out of 5.

The relationship between preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context and their self efficacy towards mathematics was inquired in the second research question. The descriptive statistics from SEMS were gathered and Pearson product moment correlation coefficients were calculated with respect to the dimensions of SEMS in order to answer this research question. The descriptive statistics can be detected from Table 4.

Table 4: Descriptive Statistics Related to the Scores from SEMS in General and its Dimensions

			Dimensions of SEMS					
	SEMS scores		Mathematics identity perception		Awareness of behavior about mathematics		Ability to convert mathematics to the life skills	
Education year	M (out of 60)	sd	M (out of 20)	sd	M (out of 30)	sd	M (out of 10)	sd
Freshmen (1)	46,79	4,29	18,54	1,68	20,96	2,90	7,28	1,41
Sophomores (2)	45,85	4,97	17,77	2,02	21,06	2,87	7,04	1,27
Juniors (3)	46,62	3,80	18,24	1,73	21,33	2,23	7,04	1,08
Seniors (4)	50,84	5,75	18,64	1,94	23,59	3,28	8,61	1,35
Total	47,44	5,06	18,30	1,85	21,67	3,02	7,47	1,4

As it can be seen in Table 4, SEMS scores of the participants can be accounted as high (M = 46,79; M = 45,85; M = 46,62; M = 50,84). The highest mean scores for each dimension of SEMS were taken from seniors.

Correlation coefficients were computed among the scores from MDCS and SEMS with regard to education years of the participants and dimensions of SEMS. Four correlation coefficients were found greater than or equal to .35. The correlation coefficient between the total scores from MDCS and SEMS was .38 Besides the coefficients between the seniors' scores from MDCS and SEMS, and juniors' scores from MDCS and SEMS were .40 and .35, respectively. Lastly, there is a high correlation between the scores taken from the third dimension of SEMS and the scores from MDCS for all participants (r = .42). This coefficient can be accounted as high enough to deduce certain relationship between two variables (Green, Salkind & Akey, 2000).

4. RESULTS AND DISCUSSION

The general purpose of this study was to determine the preservice elementary mathematics teachers' level of relating mathematical concepts and daily life context. The present data supports the conclusion that, the participants succeed of making this connection. Moreover preservice elementary mathematics teachers' level of relating mathematical concepts in daily life context is increased throughout their year of education. In fact it is not a surprising result for the researcher that seniors got higher mean score from MDCS compared with others when the undergraduate education program of participants was taken into consideration. In this program during their first four semesters the preservice teachers have to take only mathematics and education courses. No mathematics education course is required for them until their third year of education. Since linking the mathematics in daily life is a topic of mathematics education courses participants begin to deal with this topic when they are juniors. In addition to this, the importance of using mathematics in daily life situations and how to make a relationship between abstract mathematical world and concrete life were always emphasized in the content of the must and elective mathematics education courses in this program (Aşkar & Umay, 2001). Particularly in method courses the statement *"mathematics should be learned by making connections with daily life"* which is encouraged for all grade levels by the document of Principles and Standards for School Mathematics (NCTM, 2000) was the main idea in exploring mathematics. In other words, the increase in participants mean scores from MDCS in regard to education year can be taken as an indicator of the effectiveness of their undergraduate education program. The preservice elementary mathematics teachers' making connections with mathematical concepts and daily life context was enhanced as a result of their education program and especially mathematics education courses they took.

When the items of the scale were examined in detail, it can be resulted that participants were good at making a connection between probability and daily life. The context in this item was *global warming* and the mathematical concept was *dependent event in probability*. Almost all of the participants gave meaningful examples for this relationship. One of the seniors' example was *"When I enter the classroom I talk about the events because of global warming like I am in TV show. I talk about icebergs are incredibly melting, the climates are rapidly changing, the pollution of air, and water shortage, and then I talk about the reality resulting in global warming like people ignorance, oil manufactures, etc. These are all dependent events and their probability of influencing each case might be calculated beforehand."* As a result it can be claimed that when a mathematical topic is closely related with daily life better relationships could occur frequently. The participants had difficulty in making connection between the mathematical concept of *mean* and the daily life context of *blood types* for item 10. Most of them were confused in the meaning of *mean* like 21 freshmen set an example of taking mean of the blood type A and blood type B for gathering the blood type AB. They did not recognize the fact that taking the mean of A and B does not make sense and also it is impossible to have AB blood type by this calculation.

The examples given to the eighth item were very surprising. It was asked to make a relationship between the mathematical concept of *perimeter* and a context of *farm life in rural area*. In Turkish the

word of "*çevre*" is used for both *perimeter* and *environment*. %42 of freshmen and %32 of sophomores used the latter meaning of "*çevre*" and naturally gave unrelated examples like *"In a farm the environment should always be clean since many animals live there."* Although the participants misunderstood the meaning of given mathematical concept the wording could have been improved like *"measuring perimeter"*. If it was given in this way, they may have tried to make a link between the things in the farm and measuring their perimeters. On the other hand, this result gives us a clue that mathematical language and daily life language can be confused and used differently by the people.

One of the variables in this study was preservice elementary mathematics teachers' self efficacy towards mathematics. From the descriptive statistics it can be easily mentioned that all participants feel efficacious towards mathematics. It might be interpreted as an expected situation since they passed many mathematics courses in their education so succeeding in mathematics might have given them this efficacy. What is crucial for this study is a connection between self efficacy towards mathematics and ability of relating mathematical concepts and daily life context was detected by correlation coefficients. This connection can be an indicator of claiming feeling efficacious towards mathematics makes preservice elementary mathematics teachers more involved in mathematics with daily life. One of the consequences of having high self efficacy towards mathematics implied that self efficacy towards mathematics, motivation for using mathematics and applying it in various contexts are related at a certain level (Stevens, et.al., 2004). This can also be related with the undergraduate education program since particularly juniors and seniors' MDCS scores are highly correlated with their self efficacy level towards mathematics. Their mathematics and mathematical education knowledge accumulate during their education; hence better correlations with their self efficacy towards mathematics might be captured.

Additionally the MDCS was consistent with the dimension of "ability to convert mathematics to the life skills" of SEMS. This dimension has two items, namely "I believe that I am using mathematics in my daily life effectively" and "I think mathematically when I plan my day/time". Agreeing with these two statements can point out participants' effective usage of mathematics in daily life. Eventually they give better examples for relating mathematical concepts and daily life context if they use mathematics in their life. The essence of usage mathematics in daily life context as a teacher might come from the mathematics taking part in teacher's life.

5. SUGGESTIONS AND CONCLUDING REMARKS

As mathematics teacher educators who are interested in how preservice teachers will use mathematics in different ways and different contexts the findings of this study shed a somewhat light on our role in education. If it is crucial to educate preservice elementary mathematics teachers who link mathematics and various contexts to enhance connected knowing in their students it is crucial that they should experience this linkage in methods courses. As a mathematics teacher they should be familiar with recognizing mathematics in different contexts and also as mathematics teacher educators it is our responsibility to familiarize them with the learning environment involving connected mathematics. It was believed that the mathematics education courses like method course or material development in mathematics course that the participants attended give this opportunity to them. Since they were structured on the idea mathematics can be learned within its context. This was seemed to be helpful for seniors to relate mathematics and daily life. This result was consistent with the result of Koirala and Bowman's (2003) study. They found that integration with mathematics and other contexts was natural and spontaneous if preservice mathematics teachers deal with this integration in their courses. It is highly recommended that the structure of mathematics education courses in undergraduate education program should be improved by taking into account of linking mathematics in daily life.

This study also suggests that connecting mathematics and daily life might be dependent on some other variable like self-efficacy toward mathematics. As Hall (2002) suggested psychological traits like motivation, efficacy, and anxiety can have a substantial influence on dealing with mathematics in out of school contexts. Therefore further research studies can be put forward to investigate whether

there is a cause and effect relationship between self efficacy towards mathematics and relating mathematics in daily life context.

Data of this study is limited to explore only how participants make a relationship between mathematical concepts and daily life contexts. Therefore the findings of this study can be conceived as a start. A longer term study is needed for digging up preservice teachers' usage of mathematics in situations beyond daily life, like within another discipline or in any art form.

From the researcher point of view it should always be in mind that being a mathematics teacher really means that using mathematics in daily life and recognizing its role in other disciplines. Therefore continual attempts should be taken for improving preservice elementary mathematics teachers' perceptions of mathematics in general.

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GENİŞLETİLMİŞ ÖZET

Bu makalede ilköğretim matematik öğretmeni adaylarının matematiksel kavramlarla günlük yaşamı ilişkilendirme düzeyleri araştırılmıştır. İlgili alanyazın incelendiğinde bağlantılı bilme kavramının çalışmaya temel oluşturduğu görülmüştür. Bağlantılı öğrenme kavramına göre bilgi, bireyler arası etkileşim içinde diğerlerinin deneyimlerini, bakış açılarını ve anlama biçimlerini görerek yapılandırılır (Greeno, 2004). Bu noktadan hareketle, çalışmanın alt yapısı oluşturulmuş ve ilköğretim matematik öğretmen adaylarının ilişkilendirme düzeyleri konu olarak ele alınmıştır.

Çalışmanın amacı ilköğretim matematik öğretmen adaylarının matematiksel kavramları günlük yaşamla ilişkilendirme düzeylerini okudukları öğretim yılı, akademik not ortalamaları ve matematiğe karşı öz yeterliklerine göre incelemektir. Araştırma problemleri şöyledir; 1. İlköğretim matematik öğretmen adaylarının matematiksel kavramlarla günlük yaşamı ilişkilendirme düzeyleri okudukları öğretim yılı ve akademik not ortalamalarına göre nedir? 2. İlköğretim matematik öğretmeni adaylarının matematiksel kavramlarla günlük yaşamı ilişkilendirme düzeyleri ile matematiğe karşı öz yeterlikleri arasında bir ilişki var mıdır?

Araştırma problemlerine yanıt bulmak için tarama yöntemi kullanılmıştır. Çalışmaya Ankara'nın devlet üniversitelerinden birinde okumakta olan 194 ilköğretim matematik öğretmeni adayı katılmıştır. Bu adaylardan 57'si birinci sınıf, 48'i ikinci sınıf, 45'i üçüncü sınıf ve 44'ü dördüncü sınıfta okumaktadırlar. Çalışma için Matematik ve Günlük Yaşam İlişki Ölçeği (Mathematics in Daily-life Context Scale-MDCS) ve bu ölçeği değerlendirmek için ölçeğe özgü bir dereceli puanlama anahtarı geliştirilmiştir. Geçerlik çalışması için ölçek ve dereceli puanlama anahtarı üç matematik eğitimcisine sunulmuş ve uzman kanısı alınmıştır. Ölçeğin ön uygulaması sekiz matematik öğretmeni adayı ile yapılmıştır. Tüm bu çalışmalar sonucunda ölçekteki maddeler 20'den 12'ye indirilmiştir. Ölçekten alınabilecek en az puan 0 ve en fazla puan 60'tır. Ölçeğin güvenirlik katsayısı Cronbach alfa ile hesaplanmış ve .79 olarak bulunmuştur. İlköğretim matematik öğretmen adaylarının matematiğe karşı öz yeterlik düzeylerini belirlemek için Matematiğe karşı Öz Yeterlik Ölçeği kullanılmıştır. Umay (2001) tarafından geliştirilen bu ölçekte 12 madde vardır. Ölçeğin Cronbach alfa güvenirlik katsayısı .88 olarak belirtilmiştir.

Çalışmanın verileri ilköğretim matematik öğretmeni adaylarının formal ders saatlerinde toplanmıştır. Ölçek uygulanmadan önce katılımcılar araştırmanın amacı hakkında bilgilendirilip çalışmaya katılıp katılmama konusunda serbest bırakılmışlardır. Çalışmaya katılmayı kabul edenlere ölçek uygulanmıştır. Ölçeğin uygulanması 1 saat sürmüştür. Veri analizi SPSS 16.0 paket programında yapılmıştır.

Çalışmadan elde edilen verilere dayanarak ilköğretim matematik öğretmen adaylarının matematiksel kavramlarla günlük yaşamı ilişkilendirme düzeylerinin öğretim yılına göre değiştiği söylenebilir. Dördüncü sınıf katılımcılarının ilişkilendirme düzeyleri en yüksek iken birinci sınıfların ilişkilendirme düzeyi en düşüktür. Ölçekteki maddelere verilen yanıtlar incelendiğinde ilköğretim matematik öğretmen adaylarının olasılık ile ilgili bağımlı olay kavramını küresel ısınma ile iyi bağlantılandırdıkları ancak aritmetik ortalama kavramını günlük yaşamın içindeki kan grupları konusuyla ilişkilendiremedikleri gözlenmiştir.

Matematiğe karşı öz yeterlik ölçeğinden alınan puanlara göre çalışma grubunun matematiğe karşı öz yeterliğinin yüksek olduğu söylenebilir. Matematiğe Karşı Öz Yeterlik ile Matematik ve Günlük Yaşam İlişki Ölçeği arasında Pearson korelasyon katsayıları hesaplanmıştır. Bu hesaplamada katılımcıların öğretim yılları da dikkate alınmıştır. Hesaplanan korelasyon katsayıları yeterli düzeyde yüksek bulunmuştur. Bu durumda matematiğe karşı öz yeterlik ile matematiği günlük yaşamla ilişkilendirme düzeyi arasında olası bir ilişkiye işaret etmektedir.

Araştırma sonucunda ilköğretim matematik öğretmen adaylarının matematiği günlük yaşamla ilişkilendirme düzeylerinin artırılması için özel öğretim derslerinin içeriğinde matematik ve günlük yaşam, matematik ve diğer disiplinler gibi ilişkili konulara değinilmesi önerilmiştir çünkü bir matematik öğretmeni adayı olarak katılımcılar, matematiği farklı günlük yaşam durumlarında tanımalı ve kullanabilmelidirler. Matematik eğitimcilerin görevlerinden birisi de öğretmen adaylarına bu tür ortamları sunmaktır.