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# Logical Thinking Levels of Teacher Candidates

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## Abstract

Logical thinking is a thinking that reveals the right thinking by having the ability to use various concepts with their meanings, to make inferences by making suggestions and to make reasoning by focusing on problem solving. A study is planned to show where this type of thinking is among other types of thinking and what level it is in individuals. In the research, it was aimed to determine the level of logical thinking in students. For this purpose, the working group has been determined. In order to determine the level of logical thinking in the study, the Logical Thinking Scale (MDI) developed by the researcher was applied to 525 students in total at Atatürk University Kazım Karabekir Education Faculty. The relationship between the personal information form and the total scores obtained from the scale was examined. In this application, gender, department (to see the difference between numerical and verbal-weighted sections) and book reading frequency (to see if reasoning skills improve with reading frequency) are discussed. As a result of the study, it was found that students who read books every day have higher logical thinking levels. Students who study in Education Sciences and Turkish and Social Sciences Education have higher logical thinking levels than students studying in other departments.

**Keywords:** Thinking; logical thinking; teacher candidates; logic; education

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## Introduction

There is no certainty in the literature about what logical thinking is. For this reason, there are many definitions related to logical thinking. Indeed, according to Inhelder and Piaget, logical thinking is the mental operations used by individuals when certain problems are encountered. According to him, logical thinking reaches its main point in the period of concrete operations (7-11 years) and abstract operations (11-18 years) (Inhelder and Piaget, 1958). According to Lawson (1992), logical thinking is thinking that leads to conclusion by thinking resolutely. According to him, sequential thinking is the basis of logical thinking. Consecutive thinking is to take all the ideas and put them in order in a row. In addition, logical thinking is an important factor for conceptual learning as it requires logical thinking processes in terms of the constructivist process that creates conceptual knowledge in developing logical thinking ability. According to Demirel (2003), logical thinking includes finding scientific solutions to problems, classifying, generalizing, calculating, producing hypotheses and using numbers effectively by understanding the differences between concepts. Logical thinking, which is accepted as a universal human feature, involves high cognitive skill. To put it more clearly, the level of logical thinking provides us with information about the individual's level of cognitive development.

According to Yaman (2005), logical thinking involves an individual's reaching various principles and laws with some abstractions and generalizations, or solving a problem by doing various mental operations. According to Bektaşli (2006), logical thinking is more of an intellectual skill used to solve problems. At this point, logical thinking refers to the skills such as effective use of numbers, showing the analysis relations between concepts, categorizing, generalizing, establishing and analyzing hypotheses, calculating with mathematical formula. So logical thinking is seen as the key to mental reservation and complex problem solving processes. In other words, logical thinking is part of the problem solving skill. In other words, logical thinking is one of the sub-stages of problem solving. Therefore, people with logical thinking and reasoning abilities can solve complex problems. The development of logical thinking, evaluation and inquiry processes takes place during problem solving teaching. Logical thinking is one of the ways to get advanced mental activities. Thus, these ability goals depend on the level of knowledge and understanding of the cognitive domains and are an application-level activity. Logical thinking is used to evaluate ideas, knowledge and experiences (Korkmaz, 2002).

As can be understood from these definitions, logical thinking is a type of thinking that enables problem solving, making conceptual analyzes, using reasoning paths, recognizing abstract structures, distinguishing the relationship between the two situations, and making logical decisions by making various comparisons and inferences. It is important how much this type of thinking is in humans. Because this type of thinking also affects the person's relationship with himself and his environment. Also logical thinking shows similar and different points with other types of thinking. The most

commonly used types of thinking that are related to logical thinking are critical, creative, systematic, reflective and analytical thinking.

Critical thinking is based on some criteria and methods such as “clarity, consistency, rationality, skepticism and correct reasoning on any subject, fact and idea; It is a thinking that recognizes inaccurate thinking styles, gives importance to evidence and results, exhibits a research-based deeper thinking disposition, attitude and skill, thus aiming to reach not only any result but consistent, reasonable conclusions and judgments. However, as can be seen here, while the difference of critical thinking from logical thinking is logical thinking, acting on correct thinking, a structure that recognizes inaccurate thinking styles and attaches importance to evidence and results in critical thinking. However, due to its logic structure, it is a field that gives knowledge of correct thinking rules and forms and the laws of thinking (Özlem, 2004.

Creative thinking process includes rational and logical thinking and scientific approach at every stage. But in addition to this, what is essential in creative thinking, which is also referred to as a mental thinking activity, a thinking act; At the end of the process, it is not to come up with a creative product or solution. The important thing is to present and apply this process actively in all areas of life (Koray, 2003). Although creative thinking has a logical direction, it is often confused with logical thinking. When looking at the distinctions at this point, creative thinking; It carries a new and original structure. It generates ideas as well as being the source of change. While doing this, it shows features that are difficult to accept. That's why it's hard to accept. It uses abilities rather than using habitual ways of thinking. It also reveals a way of thinking that extends to the future by including creative thinking, emotions, values, attitudes, intuition and assumptions. Logical thinking is more based on knowledge. As it uses experiences, it has an acceptable side in a short time and is an extension of the past. However, logical thinking has qualifications such as good - bad, right - wrong. There are logic rules that establish logical and causal connections. Therefore, it shows features suitable for mathematical and scientific thinking. Therefore, it has different points from creative thinking (Rawlinson, 1995).

In systematic thinking, it is essential to reach the unknown based on the known and to clarify it with logical operations. From this point of view, it is seen that systematic thinking has an effect on logical thinking. If a system is a whole composed of parts that are related to each other, consistency is the state of mutual connection or harmony between parts of a logical whole. Or it is the absence of contradictions. So, one implication is that the premises are in harmony without contradicting each other (Çüçen, 2013). As can be seen, systematic thinking and logical thinking are two types of thinking that must act with each other. But logical thinking does not only require systematic thinking. That is why the points of departure are formed in this regard.

Reflective thinking is “questioning what the person did during the action, rethinking what he did later, and arranging his general knowledge accordingly” (Durdukoca & Demir, 2012, p. 358). Reflective thinking is a research process based on solving the encountered problem. Looking at these dimensions, similar and different points of logical thinking and reflective thinking are seen. There is also problem solving in logical thinking. It's logical thinking, using numbers effectively, showing the analysis relationships between concepts, categorizing, generalizing, constructing and analyzing hypotheses, and calculating with mathematical formulas (Bektasli, 2006). But problem solving remains only at this level, beliefs and feelings are not involved, as in reflective thinking.

Finally, analytical thinking includes separating the object from its content, the tendency to focus on the properties of the object by categorizing it, and it is the preference of using rules to explain and predict the behavior of objects. That is, analytical thinking refers to examining the object alone and thinking by categorizing it. In logical thinking, people with this feature are more successful in reaching their goals, taking advantage of opportunities in a complex world and coping with difficulties (Koray, 2003).

It is necessary to show the level of logical thinking, which is very important in order to see the level of reasoning, whether the concepts used are used in their own sense, and whether the correct thinking style is established in individuals. For this purpose, a study was created and in the light of this purpose, answers to the following questions were sought:

1. Do the pre-service teachers' logical thinking levels differ significantly by gender?

2. Do the pre-service teachers' logical thinking levels differ significantly according to the department?

3. Do the pre-service teachers' logical thinking levels differ according to the frequency of reading books?

## Method

### Model of the Research

In the study, it was aimed to examine the logical thinking levels of students studying at Kazım Karabekir Education Faculty of Erzurum Atatürk University in terms of gender, age, department, frequency of reading books. For this, relational scanning model, which is one of the general scanning models based on quantitative data, was used. There is a relational screening model, the relationship between two or more variables and the existence of the change between these variables (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2015; Karasar, 2005).

**Working Group**

The research was carried out on 575 students randomly selected from the students attending Kazım Karabekir Education Faculty in 2018-2019 academic year. The study group was organized in 7 departments of Atatürk Kazım Karabekir Education Faculty (Physical Education and Sports Department, Educational Sciences Department, Fine Arts Education Department, Mathematics and Science Education Department, Basic Education Department, Turkish and Social Sciences Education Department and Foreign Language Education. Department) consists of students studying. A total of 525 students, 75 students from each department, were included in the study group. 312 of 575 students are female and 213 are male.

**Data Collection Tools**

In the research, "Logical Thinking Scale" and personal information form were used as data collection tools.

**Logical Thinking Scale:** It is a likert type scale consisting of 25 items and 4 dimensions (Reasoning, Language-Meaning, DTG and Concept) developed by the researcher. In the reasoning dimension of the scale, there are items about various inferential reasoning principles and methods of reasoning. In the language-meaning dimension, there are items related to polymorphism and uncertainty, while the DTG dimension includes items related to accuracy, consistency and validity. The concept dimension includes items that give concept types and relationships between concepts.

Construct validity was examined for the validity of the scale. The validity of the scale was tested using both exploratory and confirmatory factor analysis. To determine the construct validity of the scale, AFA was performed using promax rotation and principal components analysis. As a result of the exploratory factor analysis application, 27 items was removed from the scale. It was seen that the remaining 25 items in the scale were collected in 4 sub-factors with eigenvalue greater than 1. The variance explained by these 4 factors regarding the scale is 52.85%.

Confirmatory factor analysis was performed to test the conformity of the factors determined by exploratory factor analysis to the factor structures determined by the hypothesis, that is, to verify the structure found.

**Table 1:** Goodness of fit ındices of the dfa model

| Goodness of fit indices of the DFA model | |
|---|---|
| df value | 2.69 |
| X2 | 618,48 |
| RMSEA | ,07 |
| CFI | ,95 |
| NFI | ,95 |
| SRMR | ,06 |
| GFI | ,90 |
| AGFI | ,90 |

Cronbach alpha value was examined for the reliability of the scale. In order to determine whether the items of the scale serve the purpose of measuring the property to be measured, when the item analysis is examined, the Cronbach alpha value for the first sub factor of the scale, 83, the Cronbach alpha value for the second sub factor, 75, the Cronbach alpha value for the third sub factor, 74, the fourth sub The Cronbach alpha value for the factor was 71 and the Cronbach alpha value for all questions was 83.

In addition, the Personal Information Form developed by the researcher was also used to determine the individual, department, gender, age, class, number of siblings, number of friends and parental education levels of the individual, which are other independent variables of the scale.

**Personal Information Form:** In the "Personal Information Form" used in the research, options were created in the form of an upper guideline informing gender, age, chapter read and frequency of reading in order to collect information about students' personal information.

### Data Analysis

Descriptive statistics were used to analyze the data. All statistical analyzes of the scores obtained from the scales were calculated on the computer using the SPSS 23 package program. For this, firstly, frequency, percentage, arithmetic mean and standard deviation were used from descriptive statistics. Later, in order to analyze other problems of the research, the available data were examined, parametric analysis techniques were used since the data were at least range scale, the independent variables whose effect was investigated on the dependent variable showed normal distribution and the variances were distributed equally (Seçer, 2015, p.77). Accordingly, “t” test was applied for independent groups in binary groups, and “One Way Variance Analysis” was applied in more than two groups. In cases where the difference was significant as a result of one-way analysis of variance, complementary post-hoc techniques were used to determine which groups this significant difference was among, and the Tukey test was applied because the variances were homogeneously distributed. This test was used to determine the difference between groups more clearly. In addition, simple linear regression analysis was carried out to determine whether the psychological well-being levels of the students constituting the study group predicted their gratitude and altruistic behavior levels. The margin of error was taken as ,001 for the significance control of the difference between the groups.

## Findings and Interpretation

### Findings and Interpretation Regarding Gender Variable

Below, the t-test result is tabulated and presented in independent groups conducted to reveal whether the levels of gratitude of university students differ according to gender.

**Table 2.** Averages, standard deviations and t-test results of pre-service teachers' logical thinking levels according to gender

| Gender | n | $\bar{x}$ | s | Sd | t | p |
|---|---|---|---|---|---|---|
| Girl | 312 | 86,47 | 7,16 | 808 | 26,24 | ,000*** |
| Boy | 263 | 73,94 | 6,17 | | | |

**p<,001

As seen in Table 2, the logical thinking point average of the girls is 86.47, while the average score of the boys is 73.94. Whether this difference between the averages was significant was checked by t-test in independent groups and the difference between the averages was found to be significant ($t_{808} = 26.24$; $p < ,001$). This indicates that the logical thinking level of female students is higher than that of boys.

**Findings and Interpretation Regarding the Department Variable**

One-Way Variance Analysis (ANOVA) results, which were conducted to reveal whether the logical thinking levels of pre-service teachers differ according to the section variable read, are presented by tabulating.

**Table 3.** Numbers, arithmetic averages and standard deviations of teacher candidates' differentiation status according to the department level

| Department | n | $\bar{x}$ | s |
|---|---|---|---|
| Physical Education and Sports | 75 | 79,69 | 8,79 |
| Educational Sciences | 75 | 83,51 | 10,05 |
| Fine Arts Education | 75 | 80,70 | 8,86 |
| Mathematics and Science Education | 75 | 80,10 | 9,15 |
| Basic training | 75 | 80,83 | 8,74 |
| Turkish and Social Sciences Education Foreign | 75 | 78,58 | 9,17 |
| Languages Education | 75 | 63,44 | 7,01 |
| Total | 525 | 80,95 | 9,04 |

When the numbers, averages, and standard deviations of the logical thinking levels of university students according to department were evaluated, it was found that the mean scores ($x = 83.51$) of the students studying in the department of educational sciences were higher than the others. One-Way Variance Analysis was carried out to test whether this situation makes a significant difference or not, since there are more than one variable, the groups are unrelated, and the measurements of the dependent variable are at least equally spaced scale level.

**Table 4.** One-way analysis of variance (anova) results regarding the differentiation status of teacher candidates' logical thinking levels according to the department

| Source of Variance | Total of Squares | sd | Average of Squares | F | *p* |
|---|---|---|---|---|---|
| Between groups | 1313,99 | 4 | 328,50 | 3,96 | ,003** |
| In-groups | 66761,12 | 805 | 82,93 | | |
| Total | 68075,12 | 809 | | | |

***p<,01*

As a result of the one-way analysis of variance, the obtained F value (3,961) shows that the logical thinking levels of students differ significantly according to department (p <, 01). Complementary post-hoc techniques were used to determine between which groups this significant difference was found and the Tukey test was applied since the variances were homogeneously distributed. The results are presented in Table 4.

**Table 5.** Tukey test results concerning the differentiation status of the university students' logical thinking levels according to the department

| Department (i) | Department (j) | $\bar{x}_i$-$\bar{x}_j$ | $Sh_{\bar{x}}$ | p |
|---|---|---|---|---|
| Physical Education and Sports | Foreign Languages Education | -3,82* | 1,06 | ,00 |
| | Educational Sciences | 1,21 | ,85 | ,75 |
| | Fine Arts Education | -1,01 | ,94 | ,82 |
| | Mathematics and Science Education | -,41 | 1,08 | 1,00 |
| | Basic training | -1,14 | 1,11 | ,88 |
| | Turkish and Social Sciences Education | -2,45 | ,64 | ,97 |
| Educational Sciences | Physical Education and Sports | 3,82* | 1,06 | ,00 |
| | Fine Arts Education | 2,81* | ,94 | ,00 |
| | Mathematics and Science Education | 3,41* | 1,08 | ,00 |
| | Foreign Languages Education | 1,15 | 1,09 | ,02 |
| | Turkish and Social Sciences Education | 2,72 | ,98 | ,04 |
| | Basic training | 2,68 | 1,11 | ,11 |
| Fine Arts Education | Physical Education and Sports | 1,01 | ,94 | ,82 |
| | Turkish and Social Sciences Education | -2,81 | ,94 | ,00 |
| | Educational Sciences | -1,15 | ,97 | ,04 |
| | Foreign Languages Education | ,84 | ,91 | ,89 |
| | Mathematics and Science Education | ,60 | ,96 | ,93 |
| | Basic training | -,13 | 1,00 | 1,00 |
| Mathematics and Science Education | Physical Education and Sports | ,41 | 1,08 | ,99 |
| | Educational Sciences | -3,41 | 1,08 | ,04 |
| | Fine Arts Education | -,60 | ,96 | ,97 |
| | Basic training | ,72658 | 1,13 | ,97 |
| | Turkish and Social Sciences Education | -2,18 | 1,01 | ,94 |
| | Foreign Languages Educat | ,15 | ,85 | ,88 |
| Basic training | Physical Education and Sports | 1,14 | 1,11 | ,84 |
| | Educational Sciences | 1,87 | 1,12 | ,89 |
| | Fine Arts Education | -2,68 | 1,11 | ,11 |
| | Turkish and Social Sciences Education | ,13 | 1,00 | 1,00 |
| | Mathematics and Science Education | ,73 | 1,13 | ,97 |
| | Foreign Languages Educatio | ,88 | 1,18 | ,85 |
| Turkish and Social Sciences Education | Physical Education and Sports | 3,41 | 1,40 | ,14 |
| | Educational Sciences | 5,63* | 1,15 | ,00 |
| | Basic training | 4,34* | 1,06 | ,00 |
| | Foreign Languages Education | 1,48 | 1,09 | ,75 |
| | Mathematics and Science Education | 4,72* | 1,33 | ,00 |
| | Fine Arts Education | 3,17 | 1,12 | ,01 |
| Foreign Languages Education | Physical Education and Sports | -1,30 | 1,48 | ,95 |
| | Educational Sciences | ,91 | 1,25 | ,97 |
| | Fine Arts Education | -,38 | 1,16 | ,99 |
| | Turkish and Social Sciences Education | -3,24 | 1,19 | ,07 |
| | Basic training | -4,72* | 1,33 | ,00 |
| | Mathematics and Science Education | ,84 | 1,25 | ,08 |

As seen in Table 5; When the distribution of the logical thinking levels of the students according to the department they are reading is compared to the Tukey test comparison is examined; There was a significant difference between the students studying in the Department of Physical Education and Sports and those studying in the Department of Foreign Language Education in favor of students studying in Physical Education and Sports (p <, 05). There was a significant difference in favor of students studying in Education Sciences (p <, 05) between students studying in Education Sciences and those studying in Physical Education and Sports, Fine Arts Education and Mathematics and Science Education. There was a significant difference between the students studying in the Department of Fine Arts Education and those studying in the Department of Turkish and Social Sciences Education in favor of students studying in the Department of Fine Arts Education (p <, 05). There was a significant difference in favor of students studying in the Turkish and Social Sciences Education section (p <, 05) between students studying in the Turkish and Social Sciences Education section and students studying in Education Sciences, Basic Education and Mathematics and Science Education. However, no significant difference was found among other departments (p>, 05). It is seen that the logical thinking level of the students studying in the departments with significant differences in their favor is high. Significant differences were found especially in the education sciences department and Turkish and social sciences education department. This shows that social areas are logical thinking oriented. In these areas, more social issues are addressed and it is predicted that the level of logical thinking is also high since it is thought that multi-dimensional thinking skill is higher.

**Findings and Interpretation Regarding the Reading Frequency Variable**

One-Way Variance Analysis (ANOVA) results, which were conducted to reveal whether the logical thinking levels of pre-service teachers differ according to the frequency of reading books, are presented by tabulating.

**Table 6.** Number, arithmetic mean and standard deviations of teacher candidates' logical thinking levels regarding differentiation status according to frequency of reading

| Frequency of Reading | n | $\bar{x}$ | s |
|---|---|---|---|
| Everyday | 10 | 87,45 | 6,22 |
| Once a week | 43 | 51,37 | 5,23 |
| Once in a month | 127 | 71,04 | 4,86 |
| Every 6 months | 95 | 71,06 | 4,89 |
| Once a year | 158 | 71,25 | 5,27 |
| No | 142 | 23,83 | 5,20 |
| Total | 575 | 70,95 | 8,17 |

When the number, averages and standard deviations of university students according to the number of siblings of their gratitude level were evaluated, it was found that the students' mean scores (x = 87.45) were higher than the others. One-Way Variance Analysis was conducted to test whether this difference makes a significant difference and the result is presented in Table 7.

**Table 7.** One-way analysis of variance (anova) results regarding the differentiation status of pre-service teachers' logical thinking levels according to frequency of reading

| Source of Variance | Total of Squares | sd | Average of Squares | F | *p* |
|---|---|---|---|---|---|
| Between groups | 36812,85 | 5 | 7362,57 | 189,35 | 000*** |
| In-groups | 31262,27 | 804 | 38,88 | | |
| Total | 68075,12 | 809 | | | |

**p<,001

As a result of the one-way analysis of variance, the obtained F value (189,350) shows that students' gratitude levels differ significantly according to the number of siblings (p <, 001). The Tukey test was applied to determine which significant difference between the groups was, and the results are presented in Table 8.

**Table 8.** Tukey test results concerning the differentiation status of pre-service teachers' logical thinking levels according to frequency of reading

| Frequency of Reading (i) | Frequency of Reading (j) | $\bar{x}_i$-$\bar{x}_j$ | $Sh_{\bar{x}}$ | p |
|---|---|---|---|---|
| Everyday | Once a week | -13,92* | ,80 | ,000 |
| | Once in a month | -13,59* | ,77 | ,000 |
| | Every 6 months | -13,61* | ,78 | ,000 |
| | Once a year | -13,80* | ,80 | ,000 |
| | No | -26,38* | ,86 | ,000 |
| Once a week | Everyday | 13,92 | ,80 | ,012 |
| | Once in a month | ,33* | ,72 | ,000 |
| | Every 6 months | ,31 | ,73 | ,99 |
| | Once a year | ,13 | ,76 | 1,00 |
| | No | -12,45* | ,81 | ,000 |
| Once in a month | Everyday | 13,59 | ,77 | ,89 |
| | Once a week | -,34 | ,72 | ,99 |
| | Every 6 months | ,023* | ,70 | ,000 |
| | Once a year | -,21* | ,72 | ,000 |
| | No | -12,80 | ,78 | 1,00 |
| Every 6 months | Everyday | 13,61 | ,78 | ,014 |
| | Once a week | -,31 | ,73 | ,99 |
| | Once in a month | ,023 | ,69 | 1,00 |
| | Once a year | -,19 | ,73 | 1,00 |
| | No | -12,77* | ,79 | ,000 |
| Once a year | Everyday | 13,80 | ,80 | ,015 |
| | Once a week | -,13 | ,76 | 1,00 |
| | Once in a month | ,21 | ,72 | 1,00 |
| | Every 6 months | ,19 | ,73 | 1,00 |
| | No | -12,58 | ,81 | ,045 |
| No | Everyday | 26,38 | ,86 | ,05 |
| | Once a week | 12,46 | ,81 | ,04 |
| | Once in a month | 12,79 | ,78 | ,08 |
| | Every 6 months | 12,77 | ,79 | ,047 |
| | Once a year | 12,58 | ,81 | ,022 |

As seen in Table 8; When the distribution of the logical thinking levels of the teacher candidates according to the frequency of reading books showing the Tukey test comparison is examined; There was a statistically significant difference between the students who read books every

day and once a week, once a month, once every 6 months, and those who read books every day and never read books (p <, 001). However, among students who read books once a week and those who read books once a month and those who never read books, in favor of students who read books once a week (p <, 000); In favor of students who read books once a month and students who read books once a month and once a year (p <000); A statistically significant difference was found between students who read books every 6 months and students who never read books in favor of students who read books every 6 months (p <, 000). It was observed that the logical thinking levels increased with the increase in the frequency of reading books. Because reading is thought to broaden the point of view, focus on problem solving and speed up reasoning. Therefore, it affects logical thinking.

## Conclusion, Discussion and Suggestions

Findings regarding the gender variable reveal that students' logical thinking abilities differ statistically according to their gender. The results showed that the logical thinking skills of female students are higher than male students.Studies in the literature in which there is a significant difference between the logical thinking abilities of male and female students in terms of gender (DeLuca, 1981; Hernandez, Marek & Renner, 1984; Howe & Shayer, 1981; Shemesh, 1990; Aksu & Berberoğlu, 1991; BouJaoude and Giuliano, 1991). There are also studies with a significant difference in favor of girls (Kılıç & Sağlam, 2009; Demirtaş, 2011). Yenilmez, Sungur and Tekkaya's (2005) studies on "The Effect of Gender and Class Level on Students' Logical Thinking Skills" are proportional, probabilistic, combinatorial thinking, in favor of boys, and correlational thinking and control of variables are significant in favor of girls. Some studies also indicated that there was no significant difference between logical thinking abilities by gender (Valamides, 1996; Dimitrov, 1999; Koray & Azar, 2008; Al-Zoubi, El-shar'a and Al-Salam, 2009; Fah, 2009; Kıncal & Deniz Yazgan, 2010; Piraksa, Srisawasdi and Koul, 2014). In this study, the reason for the significant difference in favor of girls, that is, the high level of logical thinking in girls, may be due to the high conceptual perception and reasoning skills of girls. Because they think more deeply and in detail, they also have the ability to make more inferences. At the same time, it can be said that because girls want to achieve more valid results, they attach importance to detailed thinking. Therefore, they are thought to have a high level of reasoning and logical thinking than men.

According to the section, it is concluded that the logical thinking level is higher in Educational Sciences and Turkish and Social Sciences Education. No supportive or contradictory studies on the subject were encountered. The reason for this is that the departments in the Faculty of Education are not considered as variable in other studies. When the data obtained as a result of this study are examined, it is seen that the logical thinking levels of the verbal-weighted sections are high. However, various studies related to logical thinking have been found to be numerical and it has been found that the logical thinking levels of numerical fields are higher. Considering the studies carried out at home

and abroad, there are many studies investigating the relationship between students' logical thinking abilities and science achievements. In these studies, it is concluded that logical thinking ability has an important role in science achievement and understanding of science concepts (Tobin and Capie, 1982; Garnett and Tobin, 1984; Lawson and Thompson, 1988; BouJaoude and Giuliano, 1991; Aksu, Berberoğlu and Paykoç 1991; Williams & Cavallo, 1995; Valanides, 1996; Johnson & Lawson, 1998; Tezcan & Bilgin, 2004; Atay, 2006; Lawson et al., 2007). Contrary to the studies mentioned, in this study, logical thinking level was observed to be more effective in social areas. As a reason, one's problem solving ability, meaning ability and communicative aspect can be thought to be effective. In connection with this, reading levels are assumed to be effective. For this reason, the frequency of reading books is another variable.

When the frequency of reading books is analyzed, there is a significant difference between the students who read books every day and those who read books once a year. This difference occurred in favor of readers every day. The reason for the high level of logical thinking among the students who read books every day is to evaluate the events from a different perspective, and to expand their vocabulary to find more comfortable in logical reasoning.

As a result, with this study, the logical thinking levels of the girls in terms of gender, students studying in Educational Sciences and Turkish and Social Sciences education in terms of the department studied, and those who read books every day according to the frequency of reading books are high.

If any suggestions are made for future studies; In this study, new studies can be done by increasing the data in the personal information form. Or instead of the logical thinking scale, logical thinking levels can be obtained with various data collection tools such as test and questionnaire. Or, if a more detailed view is desired besides a quantitative research, the level of logical thinking can be examined with qualitative studies. For example; The change of this level can be examined in detail by using qualitative data collection tools such as interview, observation. However, the working group can be expanded for lower or higher groups. Not only teacher candidates but also different age groups can be addressed. More comprehensive perspectives can be provided by carrying out studies with structures that are thought to affect the logical thinking level.

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