



# The effect of argumentation-based teaching on developing argument skills of prospective teachers, and on their willingness to debate

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## Abstract

The study aimed to examine the effect of argumentation-based teaching approach on developing prospective teachers' argument skills, and on their willingness to debate. The study employed the one-group pre-test-post-test experimental research design based on quantitative data. The participants consisted of a total of 192 3<sup>rd</sup> grade prospective teachers who were selected using maximum variation sampling method from the departments of Social Studies Education, Classroom Education and Mathematics Education in a state university in Turkey in 2019-2020 academic year. The data were obtained using the "Moral Dilemma Stories" developed by Rest (1979), and adapted into Turkish by Akkoyun (1987); and the "Scale of Willingness to Debate" developed by Infante and Rancer (1982), and adapted to Turkish by Kaya (2005). The data were analyzed via descriptive and inferential statistical analysis methods and Argumentation Assessment Rubric developed by Erduran, Simon, and Osborne (2004). The results revealed that the argumentation-based teaching increased the prospective teachers' argument skills and their willingness to debate. It was also found out that making use of such skills as researching, reasoning, discussing, expressing thoughts, and persuading, in student-oriented education systems in a more comprehensive way could be helpful to support the argumentation-based teaching approach.

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**Keywords:** Argumentation-based teaching approach, moral dilemma stories, argumentation skill, willingness to debate.

## 1. Introduction

In the new millennium, the positive correlation between the welfare, development levels, social and political progress of countries and qualified education outcomes (Hanushek & Woessman, 2010) has turned the focus of the global debate on education in a different direction. Being aware of this reality, countries have shifted their national policies on education from indicators expressed in numbers to the goal of raising qualified people in education. In the process, the main goal of the countries has been to increase the welfare of the society and to raise individuals who seek science-based solutions to the problems and produce scientific knowledge (Bilir et al., 2020). This goal, therefore, has

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triggered countries to find an answer to the question ‘*How should qualified education be?*’ The search for a qualified education has mobilized national and international organizations to direct education policies on a global scale. The work carried out by such organizations revealed a framework for quality education (Organisation for Economic Co-operation and Development [OECD], 2019). This framework has redefined the roles of schools, students and teachers by encouraging the type of individual who can produce knowledge, use it functionally in life, solve problems, and think critically (Ministry of National Education [MoNE], 2018).

Being the mirror of the society in which it is located, and the most basic system of education, schools have recently been regarded as a living organism that interacts with its environment rather than being a physical structure of four walls (Akdağ, 2003). This new role that has been assigned to schools has also influenced students and teachers. Nowadays, both the innovations and developments in learning and teaching theories and approaches (MoNE, 2018), besides the skills deemed valuable in the 21<sup>st</sup> century, have enabled students to question, research, discuss, and thus create knowledge in learning environments, rather than remaining as listeners only. Within such a modifying process, teachers are as important as students in developing such roles. Rather than being the master of the class, teachers have become guides in the classroom to convey knowledge and provide students with skills such as multi-dimensional thinking, questioning, research, and discussion. Today, while students are expected to know how to think, teachers are expected to know how to teach students to be autonomous, logical, and critical (Rapanta & Macagno, 2016). Thanks to this awareness, teachers will be able to train students who adopt the worldview of multiple truths instead of the unconditional world view based on accepting a single truth (Titiz, 2013).

The existence of a world with multiple truths is possible with creating an ideal classroom environment that provides students with the opportunity to express themselves rather than keeping silence (Kayaaalp & Şimşek, 2020). There are various qualities teachers should have in these thinking-friendly classroom environments (Doğanay & Sarı, 2012). Providing students with higher-order thinking skills such as questioning, critical thinking, decision making or problem solving is only possible with teachers who already have these skills and competencies (Kabataş-Memiş & Çakan-Aktaş, 2020). It is very important for teachers to know the appropriate teaching methods to use in learning environments so that they can design learning environments in a questioning, investigative and critical way. In other words, it is a necessity to use the appropriate teaching methods to raise qualified people in learning environments (Şimşek, 2015). Considering this necessity, ‘Argumentation-Based Teaching (ABT)’ approach stands out as one of the contemporary teaching models through which prospective teachers can both develop their skills of researching, questioning and expressing themselves within an appropriate discussion culture prior to their professional careers and can use effectively in their professional lives (Kara, Yılmaz & Kınır, 2020; Küçük & Aycan, 2014).

### *1.1 Argumentation-based teaching approach*

The ABT approach, which allows students to make arguments through scientific inquiries (Choi, Notebaert, Diaz & Hand, 2010), includes discussion and reconciliation processes in which various arguments are formed using questions, claims and evidence (Günel, Akkuş, Hohenshell & Hand, 2004). The ABT is one of the effective approaches that can be used in the development of higher-order thinking skills such as problem

solving, critical thinking and decision-making due to embodying the argumentative method in its nature and through its existing components (Torun, 2020). At the basis of the ABT approach is the argumentation process in which students support their claims about a subject with justifications. Argumentation is a discussion process between individuals with different perspectives (Osborne, Erduran & Simon, 2004; Sampson & Clark, 2008). In this process, the students participate in the discussion and try to convince people with different views by supporting their claims with evidence (Evagorou & Osborne, 2013). The argumentation process, in which scientific information can be discussed individually or in groups (Büyükalın-Filiz & Işıker, 2019), provides students with the opportunity to express, support, evaluate, and review and write their thoughts through discussions (Simpson & Gliem, 2009). Thus, unlike traditional methods that give students no opportunity to think, the argumentation-based learning process do not express in advance the results that students will come up with (Aktaş & Kivılcın-Doğın, 2018). Rather, students are expected to be able to defend their views against opposing views, without agreeing to the ideas presented to them as they are (Demirel, 2016). At this stage, students have to go through some mental processes such as thinking, reasoning, discussing, evaluating different ideas and justifying their own thoughts with evidence (Erduran, 2020; Fettahlıođlu & Aydođdu, 2020; Zambak & Magiera, 2020).

Different argumentation models have been developed by many researchers in order to evaluate the arguments made depending on the structuring of the argumentation process (Zohar & Nemet, 2002; Lawson, 2003; Kelly & Takao, 2002; Schwarz, Neuman, Gil & Ilya, 2003; Sandoval, 2003; Walton, 2009; Puvirajah, 2007). This research used the Toulmin's Argumentation Model (TAP), which expresses argumentation as a process in which reasons are used to support or refute a claim (Toulmin, 2003), and which develops the argument's structuring process to systematically explain the components that make up the argument and the connections between these components. The TMA model is presented in Figure 1.

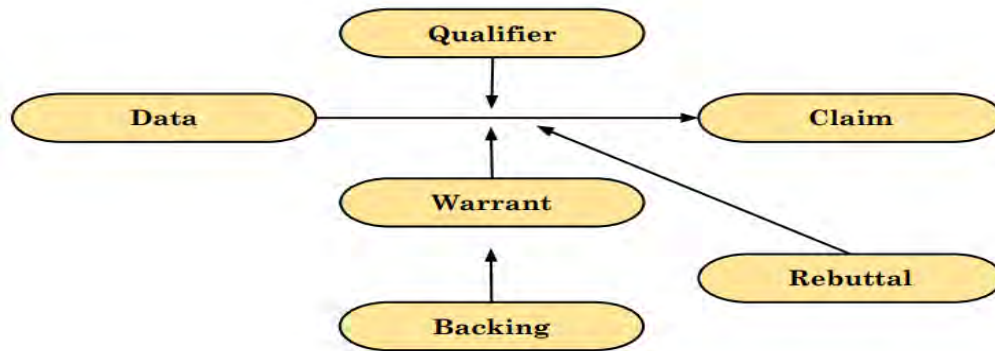


Figure 1. Toulmin's model of argumentation (Toulmin, 2003)

Among the components that make up the structure of Toulmin's Model of Argumentation, a *claim* expresses the asserted opinions, the *grounds* indicates the evidence supporting the claim, the *warrant* refers to the statements explaining the relationship between the claim and the grounds, *backing* refers to the assumptions that strengthen the relationship between the *grounds* and the claim, and the *rebuttal*

indicates the cases where the claims can be invalid, and the *qualifier* refers to situations in which the claim can be true and valid (Toulmin, 2003).

The results of the studies in the relevant literature on the ABT method indicate that applying this approach results in a positive impact on the *academic success* of students (Grimberg, 2008; Yeşildağ-Hasançebi & Günel, 2013; Ceylan, 2010; Kabataş-Memiş, 2011; Uluay, 2012; Polat, 2014) in particular, besides *conceptual understanding* (Büber, 2015; Hasnunidah, Susilo, Irawati & Suwono, 2020; Jang, 2011; Solak, 2016; Yıldırım, 2020), *higher-order thinking skills* (Antiliou, 2012; Büyükalan-Filiz & Işiker, 2019; Giri & Paily, 2020; Kabataş-Memiş & Çakan-Akkaş, 2020; Kunsch, Schnarr & Van Tyle, 2014; Nussbaum & Sinatra, 2003; Nussbaum, Winsor, Aqui & Poliquin, 2007; Van Aufschnaiter, Erduran, Osborne & Simon, 2008), *argumentation skills* (Fan, Wang & Wang, 2020; Foong & Daniel, 2013; Hsu, Van Dyke, Chen & Smith, 2015; Faize & Dahar, 2017; Torun & Açıkgül-Fırat, 2020), as well as on *teaching socio-scientific issues* (Dawson & Carson, 2020; Karakaş & Sarıkaya, 2020; Zhu, Lee, Wang, Liu, Belur & Pallant, 2017; Xiao, 2020). However, it has been demonstrated that through the ABT approach, students can learn the subjects better, their self-confidence increases, and they gain a sense of responsibility (Kabataş-Memiş, 2014).

Considering the studies conducted, it is determined that argumentation, which is among the approaches in which research and inquiry-based science education is integrated, concentrates especially in the field of science education (Erduran, 2020; Evagorou, Nicolaou & Lymbouridou, 2020; Najami, Hugerat, Kabya & Hofstein, 2020; Short, Van der Eb & McKay, 2020; Choden & Kijkuakul, 2020; Milanovic & Trivic, 2020), besides the limited number of studies in the field of social studies (Akbaş, Şahin & Meral, 2019; Bulut, Kaçar & Arıkan, 2019; Demir, 2017; Dingler, 2017; Oğuz & Demir, 2016; Torun, 2015). Despite the expressed positive results of the ABT approach, students appear to have difficulty in making an argument on a problem they faced during the argumentation process and cannot form an argument at the same level (Jonassen & Kim, 2010; Sandoval & Millwood, 2005; Torun & Açıkgül-Fırat, 2020). Çetin, Kutluca, and Kaya (2013) emphasized that there are few studies in which the argument level is determined. In this context, it is considered important to provide learning environments where students can gain argumentation skills. Given that the people who will present these learning environments to students are teachers, it is inevitable that teachers should have these skills and prepare appropriate learning environments (Kabataş-Memiş & Çakan-Aktaş, 2020). As a matter of fact, it is necessary that prospective teachers also have such skills as they will be the teachers in the future (Torun & Açıkgül-Fırat, 2020; Kara, Yılmaz & Kingır, 2020). Namdar and Tuskan (2018) stated that teachers face some difficulties in planning lessons based on argumentation and in relevant classroom practices. In addition, many other researchers have emphasized that teachers have some deficiencies with the argumentation process and that they do not have sufficient experience with argumentation (Erduran, Ardaç & Yakmacı-Güzel, 2006; Simon, Erduran & Osborne, 2006; Özcan, 2016; Yıldırım, 2020). By the same taken, Çetinkaya and Taşar (2018) stated that the studies focus more on the variables of academic achievement, the nature of science, conceptual understanding, and recently on the attitude towards the lesson and discussion, as well as various skills, in particular, and emphasized the fact that the studies conducted with prospective teachers are limited. In addition, it was stated by Baydaş, Yeşildağ-Hasançebi, and Kilis (2018) that it is of extreme importance to demonstrate how much the willingness to debate, which can be measured through the scale, reflects the real situation through practices in real environment.

Considering the positive results of argumentation as a guide and its deficiencies as a gap that should be completed in the literature, this study used Kolberg's moral dilemma stories in determining the prospective teachers' argument-making skills. Based on Kohlberg's work (Naylor & Diem, 1987), the acquisition of moral values according to the moral reasoning approach can be achieved in line with the reasoning processes that are shaped according to the cognitive development of a person (Ekşi & Katılmış, 2011; Doğanay, 2009). In this direction, the students are presented with stories that include dilemmas so that they can develop critical thinking and reasoning (Yiğittir & Kaymakçı, 2012), and bring solutions to problems by thinking and discussing (Karatay, 2011; Yeşil & Aydın, 2007). During the dilemma stories, the reasoning process, logical foundations and evaluations used are as important as the way a person solves the problem (Aydın, 2008). While this process is being carried out, small groups are asked to discuss the stories with moral dilemmas based on 'why and what for' (Suparka & Johnson, 1975) because it is the best way for students to discuss with each other to gain a certain understanding of the problem (Ellis, 2007). During the discussions, whether the answers given by the students are correct or incorrect does not matter. As a result of the applications, the participants who have developed moral reasoning skills can have the ability to negotiate critically and rationally, and can critically evaluate different views and change their opinions when necessary (Çiftçi, 2003). In this process of change, it is believed that using moral dilemma stories based on reasoning and discussion will provide positive changes on students' argument-making skills and willingness to debate. The strengths of this study can be expressed as the comparison of the argumentation skills of prospective teachers from different fields rather than a single field, inclusion of moral dilemma stories in determining argumentation skills, and analysis of the discussion processes of prospective teachers. It can be assumed that this strong structure has shaped this study in a way different from previous studies conducted with the ABT. Thus, we aimed to examine the effect of the ABT on prospective teachers' argument-making skills and willingness to debate. For this purpose, answers were sought to the following research questions:

- ❖ To what extent is the ABT approach effective on prospective teachers' argument-making skills?
- ❖ Does the ABT approach have a significant effect on prospective teachers' willingness to debate?

## **2. Method**

### *2.1. Research design*

This study employed one-group pre-test-post-test experimental design, which is one of the quantitative research approaches (McMillan & Schumacher, 2014). In the single group pre-test-post-test design, the effect of the dependent variable is measured not only after the application but also before the application (Fraenkel, Wallen & Hyun, 2012). An experimental design was preferred because this study aimed to examine the effect of the ABT method on prospective teachers' argumentation skills and willingness to debate.

## 2.2 Participants

The participants of the study included a total of 192 third grade students in the Departments of Social Studies Education, Classroom Education and Mathematics Education at a state university in the 2019-2020 academic year in Turkey. They were selected via maximum variation sampling model on voluntary basis.

## 2.3. Data Collection Tools

The data collecting tools of the study were as in the following:

### 2.4. The Scale of Willingness to Debate

The “Scale of Willingness to Debate” developed by Infante and Rancer (1982) was used to determine prospective teachers' willingness to debate. Adapted to Turkish by a validity and reliability study by Kaya (2005), the scale consists of 20 items in total and was graded as a 5-point Likert as *Always, Often, Sometimes, Rarely* and *Never*. The reliability coefficient of the original form of the scale was .91, while it was .71 after the scale was translated into Turkish. The internal consistency reliability coefficient (Cronbach's alpha) of the argumentativeness scale for this study was calculated as .82.

### 2.5. Moral Dilemma Stories

In order to determine the level of argumentation of the prospective teachers, the study included the four dilemma stories in the opinion test, which was developed by James Rest (1979) based on Kohlberg's theory of cognitive moral development (Elm & Weber, 1994) and adapted into Turkish by Akkoyun (1987) as the stories were considered to be suitable for Turkish culture. The dilemma stories used in this study are ‘A Doctor’s Dilemma’, ‘An Employer’s Dilemma’, ‘A Fugitive Prisoner’s Dilemma’, and ‘Heinz’s Dilemma’. After the prospective teachers read the moral dilemma stories, they were asked to write their opinions using the claim, grounds, warrant, backing, and rebuttal components to express on what reason they based their opinions. Argument levels were measured based on what the prospective teachers wrote.

### 2.6. The implementation process

Before starting the application, prospective teachers were first informed about the purpose of the research and argumentation-based teaching, and sample argumentation activities were conducted with them in order to make them comprehend the points that need to be considered while creating argumentation. The application process took 6 weeks in total, during which the following four moral dilemma stories were used: A Doctor’s Dilemma (Story 1), An Employer’s Dilemma (Story 2), A Fugitive Prisoner’s Dilemma (Story 3), and Heinz's Dilemma (Story 4). The first week of the application process was reserved for pre-tests, the last week for post-tests, and the rest 4 weeks for moral dilemma stories. In the application process, firstly, prospective teachers were divided into groups of 5 and handed out activities containing moral dilemma stories to be used in the application process. The participants were given a moral dilemma activity every week. During the moral dilemma activities, prospective teachers were asked to make their arguments about the dilemma they faced and to formulate their arguments

individually, first, and then share their arguments with their groupmates, defend their arguments using argument components, and convince their groupmates who defended a different claim. After each group came up with their arguments, the group spokespersons presented the claims they defended to the class, followed by small group discussions held to defend their claims, and a course process was finalized in that way. Some images of the application are presented in Figure 2.



Figure 2. Images from the Application Process

### 2.7. Data analysis

Figure 3 presents the operations performed prior to proceeding to the analysis of the data.



Figure 3. The process prior to data analysis

Considering the aims of the research and the research questions, the following tests were taken into account in the analysis of the data:

- ✓ Paired sample t test and Wilcoxon test to determine whether there is a significant difference between pre-test and post-test scores regarding students' argumentativeness.
- ✓ The argumentation level assessment rubric to determine the students' argument skills.
- ✓ The effect size value was calculated in order to determine how effective the application was. The value of 0.2 indicates a small effect size, 0.5 a medium



effect, and 0.8 a large effect size (Green & Salkind, 2005; Can, 2017), which were all taken into consideration for the effect size in the study.

- ✓ In the analysis of the data the argumentation evaluation rubric developed by Erduran, Simon, and Osborne (2004) was used to evaluate the arguments created by the prospective teachers through moral dilemma stories, according to the argument components. Table 1 presents the argument components and levels constituting the argumentation assessment rubric developed by Erduran et al. (2004).

Table 1. Argumentation assessment rubric

Argumentation Level	Argumentation Content / Component
Level 1	A simple claim or a counter claim against a simple claim.
Level 2	A simple claim along with another claim, grounds, warrant or backing, but without any rebuttal.
Level 3	The claims, counter-claims, along with the grounds, warrant, backing and weak rebuttals.
Level 4	The claims, the grounds, warrant, backing and a firm rebuttal
Level 5	The claims, the grounds, warrant, backing and more than one rebuttal.

### 3. Results

#### 3.1. Results regarding the first research problem

In the first week of the application, ‘A Doctor’s Dilemma’ (Story 1) was performed as an activity. Figure 4 presents the findings about the levels of argument made by the prospective teachers regarding the activity called a Doctor’s Dilemma.

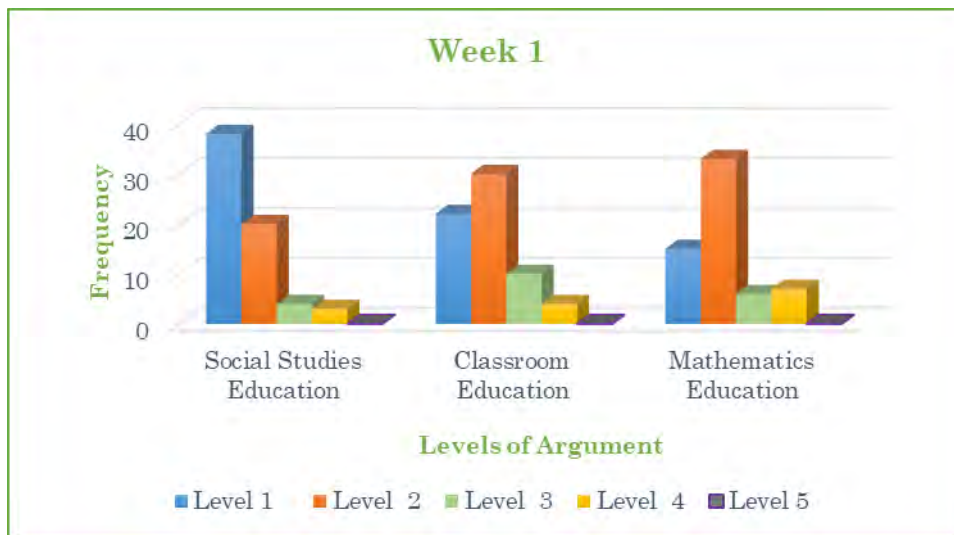


Figure 4. The argument levels of prospective teachers regarding the first week’s activity



The analysis of the arguments made by the prospective teachers regarding the Doctor's Dilemma (Story 1) activity revealed that the prospective teachers studying in Social Studies Education formed  $f = 38$  arguments at Level 1,  $f = 20$  at Level 2,  $f = 4$  at Level 3, and  $f = 3$  at Level 4. On the other hand, the prospective teachers studying in Classroom Education made  $f = 22$  arguments at Level 1,  $f = 30$  at Level 2,  $f = 10$  at Level 3 and  $f = 4$  at Level 4, while the prospective teachers of Mathematics Education made  $f = 15$  arguments at Level 1,  $f = 33$  at Level 2,  $f = 6$  at Level 3, and  $f = 7$  at Level 4 (Figure 4).

In the second week of the application, 'An Employer's Dilemma' (Story 2) activity was applied. Figure 5 presents the findings about the levels of argumentation created by the prospective teachers regarding the dilemma.

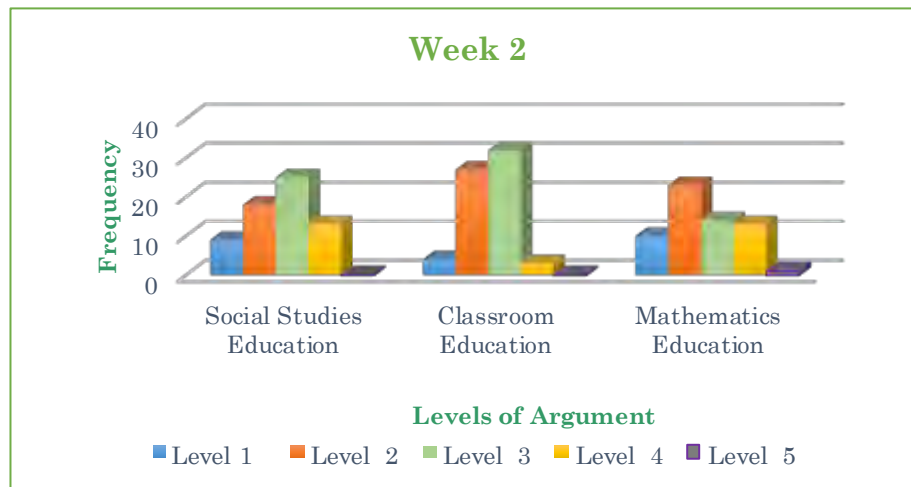


Figure 5. The levels of argument of prospective teachers regarding the second week's activity

The analysis of the arguments made by the prospective teachers regarding the Employer's Dilemma (Story 2) activity revealed that the prospective teachers studying in Social Studies Education formed  $f = 9$  arguments at Level 1,  $f = 18$  at Level 2,  $f = 25$  at Level 3, and  $f = 13$  at Level 4. On the other hand, the prospective teachers studying in Classroom Education created  $f = 4$  arguments at Level 1,  $f = 27$  at Level 2,  $f = 32$  at Level 3 and  $f = 3$  at Level 4, while the prospective teachers of Mathematics Education made  $f = 10$  arguments at Level 1,  $f = 23$  at Level 2,  $f = 14$  at Level 3, and  $f = 13$  at Level 4 (Figure 5).

In the third week of the application, 'A Fugitive Prisoner's Dilemma' (Story 3) activity was applied. Figure 6 presents the findings about the levels of argumentation created by the prospective teachers regarding the dilemma.

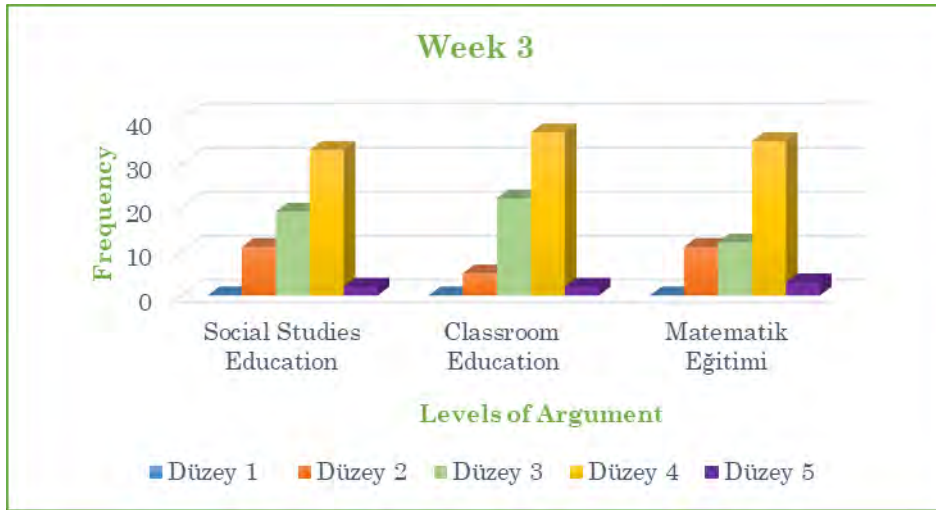


Figure 6. The levels of argument of prospective teachers regarding the third week's activity

The analysis of the arguments made by the prospective teachers regarding the Fugitive Prisoner's Dilemma (Story 3) activity revealed that the prospective teachers studying in Social Studies Education formed  $f = 11$  arguments at Level 2,  $f = 19$  at Level 3,  $f = 33$  at Level 4, and  $f = 2$  at Level 5. On the other hand, the prospective teachers studying in Classroom Education created  $f = 5$  arguments at Level 2,  $f = 22$  at Level 3,  $f = 37$  at Level 4, and  $f = 2$  at Level 5, while the prospective teachers of Mathematics Education made  $f = 11$  arguments at Level 2,  $f = 12$  at Level 3,  $f = 33$  at Level 4, and  $f = 3$  at Level 5 (Figure 6).

In the fourth week of the application, 'Heinz's Dilemma' (Story 4) activity was applied. Figure 7 presents the findings about the levels of argumentation created by the prospective teachers regarding the dilemma.

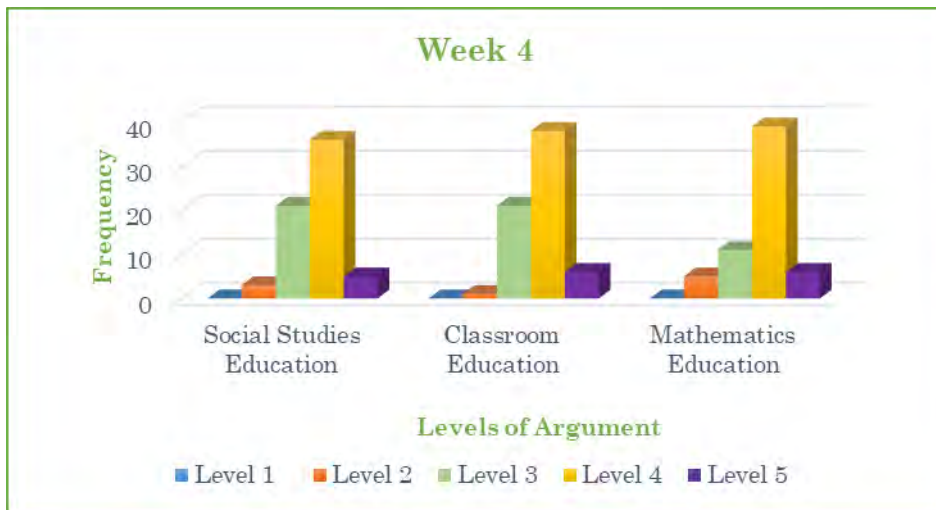


Figure 7. The levels of argument of prospective teachers regarding the fourth week's activity

The analysis of the arguments made by the prospective teachers regarding the Heinz’s Dilemma (Story 4) activity revealed that the prospective teachers of Social Studies Education formed  $f = 3$  arguments at Level 2,  $f = 21$  at Level 3,  $f = 36$  at Level 4, and  $f=5$  at Level 5. On the other hand, the prospective teachers of Classroom Education created  $f =1$  arguments at Level 2,  $f = 21$  at Level 3,  $f = 38$  at Level 4, and  $f=6$  at Level 5, while the prospective teachers of Mathematics Education made  $f = 5$  arguments at Level 2,  $f = 13$  at Level 3,  $f = 39$  at Level 4, and  $f=6$  at Level 5 (Figure 7).

The argumentations made by the prospective teachers and their levels regarding the activities during the application (for 4 weeks) are presented in Table 2 and Figure 8 below.

Table 2. The argumentations made by the prospective teachers and their levels regarding the activities during the application

Week	Activity	Level 1 ( $f$ )	Level 2 ( $f$ )	Level 3 ( $f$ )	Level 4 ( $f$ )	Level 5 ( $f$ )
Week 1	Story 1	75	79	20	14	0
Week 2	Story 2	23	68	71	29	1
Week 3	Story 3	0	27	53	103	7
Week 4	Story 4	0	9	54	114	17

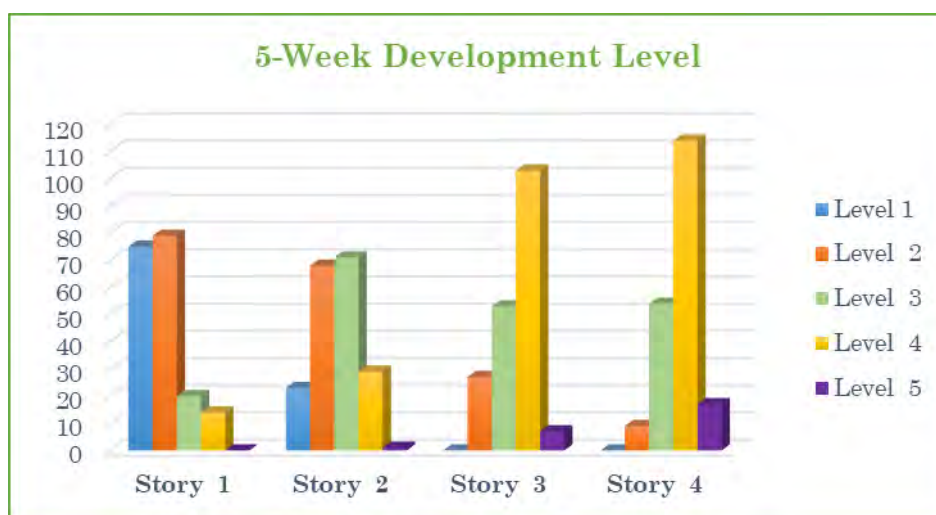


Figure 8. Argumentation levels created by prospective teachers during the application

Table 2 presents that prospective teachers made  $f = 75$  arguments at Level 1 in the first week’s activity (Story 1),  $f = 23$  in the second week’s activity (Story 2),  $f = 0$  in the third week’s activity (Story 3), and  $f = 0$  in the fourth week’s activity (Story 4). At Level 2, on the other hand, the prospective teachers made  $f= 79$  arguments in the first week’s activity (Story 1),  $f = 68$  in the second week’s activity (Story 2),  $f=27$  in the third week’s activity (Story 3), and  $f=9$  in the fourth week’s activity (Story 4). At level 3, the prospective teachers made  $f= 20$  arguments in the first week’s activity (Story 1),  $f = 71$  in the second week’s activity (Story 2),  $f=53$  in the third week’s activity (Story 3), and  $f=54$  in the fourth week’s activity (Story 4). At level 4, the prospective teachers made  $f= 14$

arguments in the first week’s activity (Story 1),  $f = 29$  in the second week’s activity (Story 2),  $f=103$  in the third week’s activity (Story 3), and  $f=114$  in the fourth week’s activity (Story 4). Finally, at level 5, the prospective teachers made  $f= 0$  argument in the first week’s activity (Story 1),  $f = 1$  in the second week’s activity (Story 2),  $f=7$  in the third week’s activity (Story 3), and  $f=17$  in the fourth week’s activity (Story 4)

Based on the results, we concluded that the prospective teachers in all three departments produced more arguments at Level 1 and Level 2 in the first week of the application process. In the second week, however, the prospective teachers of Social Studies Education and Classroom Education made more argumentations at Level 3, whereas those in Mathematics Education department seemed to have produced more arguments at Level 2. Still, in the third and fourth weeks of the application process, the prospective teachers studying in all three departments produced arguments at Level 4 by using all of the argument components (claim, grounds, warrant, rebuttal and backing). Also, the prospective teachers produced arguments at Level 5, in which more than one rebuttal was used, in the fourth week of the application. In this context, it can be assumed that as the process progresses in such a way to enable the prospective teachers to get used to the argumentation process, their level of argument-making increased and they produced better quality arguments.

### 3.2. The results regarding the second research problem

In order to determine the effects of argumentation-based teaching on prospective teachers' willingness to debate by using moral dilemma stories, the prospective teachers were given the ‘Willingness for Argumentation Scale’ as a pre-test and a post-test. Table 3 presents the descriptive statistics and paired samples t test results regarding pre-test and post-test data of prospective teachers of Classroom Education and Social Studies.

Table 3. The descriptive statistics and paired samples t test results regarding pre-test and post-test data of prospective teachers of classroom education and social studies

Department	Scale	N	$\bar{X}$	Ss	Sd	t	p
Social Studies	Pre-test	65	69.47	9.26	64	-3.185	.002
	Post-test	65	74.50	9.55			
Classroom Education	Pre-test	66	65.16	9.42	65	-5.923	.000
	Post-test	66	74.16	8.99			

Table 3 shows the descriptive statistics of the data obtained from the pre-test and post-test of the scale, indicating that the post-test mean scores of the prospective teachers are higher than the pre-test mean scores. Paired Samples t test was conducted to determine whether the difference between pre-test and post-test mean scores was statistically significant. Table 3 demonstrates that there was a statistical significance between the pre-test and post-test scores of students' willingness to debate according to the data obtained from the scale (*Social*,  $t_{(64)} = -3.185$ ,  $p = .002$ ;  $p < .05$ ; *Classroom*,  $t_{(65)} = -5.923$ ,  $p = .000$ ;  $p < .05$ ). The effect size value calculated as a result of the analysis shows that this difference is small for Social Studies Education ( $d = 0.39$ ), while at medium level for classroom education ( $d = 0.72$ ). Table 4 and Table 5 present the descriptive statistics for Mathematics Education data and Wilcoxon Test results.

Table 4. Descriptive statistics of the scores obtained from the pre-test and post-test data of the scale

Department	Scale	N	$\bar{X}$	Ss
Mathematics	Pre-test	61	66.19	10.73
	Post-test	61	74.39	9.85

Table 4 shows the descriptive statistics of the data obtained from the pre-test and post-test of the scale, indicating that the post-test mean scores of the prospective teachers are higher than the pre-test mean scores. The Wilcoxon test was conducted to determine whether the difference between pre-test and post-test mean scores was statistically significant. Table 5 presents the Wilcoxon test results.

Table 5. The Wilcoxon test results of the scores obtained from the pre-test-post-test data of the scale

Department	Scale	N	Average Rank	Average Total	z	p
Mathematics	Negative Rank	14	28.11	393.50	-3.967	.000
	Positive Rank	47	31.86	1497.50		
	No Significance	0				

Table 5 shows that there is a statistical significance between pre-test and post-test scores of prospective teachers' willingness to debate according to the data obtained from the scale (*Mathematics*,  $z=-3.967$ ,  $p=.000$ ;  $p < .05$ ). The effect size value calculated as a result of the analysis shows that it is at a medium level for Mathematics Education ( $r = 0.50$ ). Figure 9 presents the pre-test and post-test mean scores of the prospective teachers for willingness to debate.

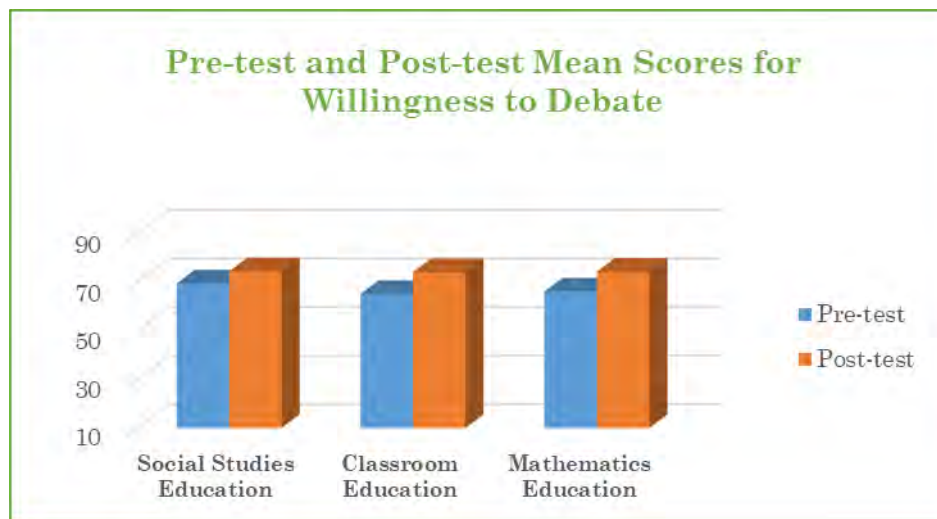


Figure 9. Pre-test and post-test mean scores for willingness to debate

Figure 9 indicates that there is a change between pre-test scores and post-test scores in terms of the willingness of prospective teachers (Social Studies, Classroom and Mathematics Education) to debate. It was determined that the difference, which emerged in terms of willingness to debate, occurred in the fields of Classroom Education, Mathematics Education and Social Studies Education, respectively.

#### 4. Discussion

This study examined the effect of argumentation-based teaching on prospective teachers' argumentation skills and willingness to debate. The first result shows that as the application process progresses, the argumentation level of the prospective teachers increases and they produce better quality arguments. The results of this study and those of the studies in the literature on the ABT have parallel features (Aktaş & Kivilcan-Doğan, 2018; Dawson & Carson, 2020; Erduran et al., 2004; Fan, Wang & Wang, 2020; Yıldırım, 2020; Wissinger, 2012; Nussbaum & Edwards, 2011). The low levels of the arguments formed by the prospective teachers during the initial weeks can be attributed to the fact that they have not encountered a lesson process in which the argumentation approach was applied before and they were not knowledgeable enough about the approach. As a matter of fact, it has been stated by different researchers that having a prior training on argumentation may be a factor affecting the level of argumentation, and that individuals' understanding of argumentation and acquiring the necessary argumentation skills will increase the quality of their arguments (Erduran et al., 2004; Osborne et al., 2004; Venville & Dawson, 2010; Zohar & Nemet, 2002; Torun & Şahin, 2016; Torun & Açıkgül-Fırat, 2020). When the argumentation development process was investigated in different studies in the literature, Karakaş and Sarıkaya (2020) emphasized that group activities improve argumentation, and it is, therefore, important to include group activities. As a result of their study to improve students' argumentation skills and boost the use of argumentation by teachers, Erduran et al., (2004) found that the levels of arguments produced by students during the process increased. Likewise, Wissinger (2012) observed in the study conducted in the social studies course that students were able to learn the argument schemes and ask critical questions during discussion, thereby increasing their levels of argumentation. The argumentation process gives students the opportunity to gain skills such as argumentation and reasoning while constructing scientific knowledge (Erduran & Jimenez-Aleixandre, 2007). Unlike the studies in the literature, moral dilemma stories were used in this study in determining prospective teachers' argumentation skills. A number of reasons can be assumed to explain how the argumentation-based teaching, which is conducted through moral dilemma stories (Gardiner & Gander, 2015) and improves the reasoning skills of individuals who are confronted with dilemma situations, boosts the argumentation skills of prospective teachers. Moral dilemma stories lead an individual to think more deeply in terms of mental and moral aspects by requiring cognitive inquiry (Power, Higgins & Kohlberg, 1989), which is the core of argumentation (Ekşi & Katılmış, 2011). During the contemplation process, in addition to the way people solve problems, the reasoning process, logical bases and evaluation steps used while reaching the solution (Aydın, 2008) constitute the basic components of argumentation. In other words, steps such as claim, grounds, and rebuttal that should be involved in the argumentation process will enable prospective teachers to make judgments in the process of participating in moral dilemma activities, and to find solutions to problems by thinking and discussing (Karatay, 2011). Thus, a claim put forward by the prospective teachers regarding the problem in the moral

dilemma stories necessitates the grounds to support this claim and a rebuttal against different ideas. This helps prospective teachers to develop argumentation skills in time.

Another result of the study is that there is a significant difference between the pre-test and post-test scores of prospective teachers' willingness to debate, indicating that argumentation-based teaching has a positive effect on prospective teachers' willingness to debate. The development of prospective teachers' willingness to debate can be gathered around various reasons. Yet, debating with each other is the best way for students to gain a certain understanding of the problem (Ellis, 2007). During the argumentation-based teaching process, which contains discussion in its essence, students are asked to explain by giving reasons and through discussing with other students what a person should do (Superka et al., 1976) in the face of moral dilemmas, and it is believed to develop students' willingness to debate. In addition, the fact that moral dilemma stories are related to real life situations leads prospective teachers to focus on the story and come up with a solution specific to the existing problem because they will feel obliged to respond to dilemmas presented in real life. As a matter of fact, the answers given to moral dilemmas emerge at the end of a process of reasoning (Ünlü, 2019). The prospective teachers experienced the process of making arguments cognitively and sought logical solutions. The most important step contributing to this search is the argumentation process that allows different ideas to be shared democratically with the appropriate discussion culture, rather than producing the correct or wrong answers during the application, for in the argumentation process, students can present their claims with appropriate evidence, and have the chance to convince the others with counter-opinions through their own rebuttal. However, students' efforts to make the right decision in the learning environment during the discussion process enable students to think, reason, and focus on the subject, providing them with a more qualified learning experience (Chen, Benus & Hernandez, 2019). Thanks to such opportunities, the discursive skills that students develop during the dialogue / discussion process with their peers are not only valuable, but are also important for students to form effective arguments and to defend them through assessing from different angles (Shi, Matos & Kuhn, 2019). People who have developed moral reasoning skills as a result of practices can have critical and rational negotiation ability, evaluate different ideas by criticizing and change their opinions when necessary (Çiftçi, 2003). However, when looking at the different studies focusing on improving the willingness to debate through the ABT method, it was emphasized by the researchers that the argumentation process improved the students' argumentation skills and encouraged them to debate (Ceylan, 2010; Demirci-Celep, 2015; Çınar, 2013; Öztürk, 2013; Demirel, 2016; Osborne et al., 2004; Öğreten & Uluçınar-Sağır, 2014; Simon, et al., 2006; Zohar & Nemet, 2002). Similarly, Baydaş, Yeşildağ-Hasancebi & Kilis (2018) found that ABT was effective on students' willingness to debate, and that there was a positive relationship, albeit low, between willingness to debate and participation in the discussion. In addition, studies conducted with teachers and prospective teachers by different researchers concluded that the argumentation process prompted individuals to interact, discuss and listen to each other (Baydaş, Yeşildağ-Hasancebi & Kilis, 2018; Ceylan, 2010; Hiğde & Aktamış, 2017; Simon et al., 2006; Yıldırım & Nakiboğlu, 2014).

It can be assumed that the reasons presented in the literature on the effect of the argumentation process on students' willingness to debate and the reasons found in this study are similar. Contrary to the positive results of the ABT method on the willingness to debate, there are other studies indicating that the argumentation process does not make a difference in students' willingness to debate, and that students act hesitantly in case of discussion and their level of discussion is low (Aktaş, Kivilcan-Doğan, 2018;



Demircioğlu, 2011; Rod-Watson, Swain & McRobbie, 2004; Sampson, Grooms & Walker, 2011). In this context, it is believed that it will be possible to enhance the impact of the ABT method on the willingness to debate with new studies.

## 5. Conclusions and Suggestions

It has been observed that the ABT method, which involves both teachers and students as stakeholders in the learning process, made an important contribution to the search for qualified, versatile and innovative education in the 21<sup>st</sup> century world. It is very important that ABT, which is shaped by moral dilemma stories, surrounds students with higher-order thinking skills such as research, questioning, reasoning, generating ideas, using evidence and evaluating them, and directing them to create quality arguments and be active in the discussion process. The positive effects of the ABT are reflected in the results of this research as in many studies. Figure 10 presents the result of the ABT method, which was formed with moral dilemma stories in this study.

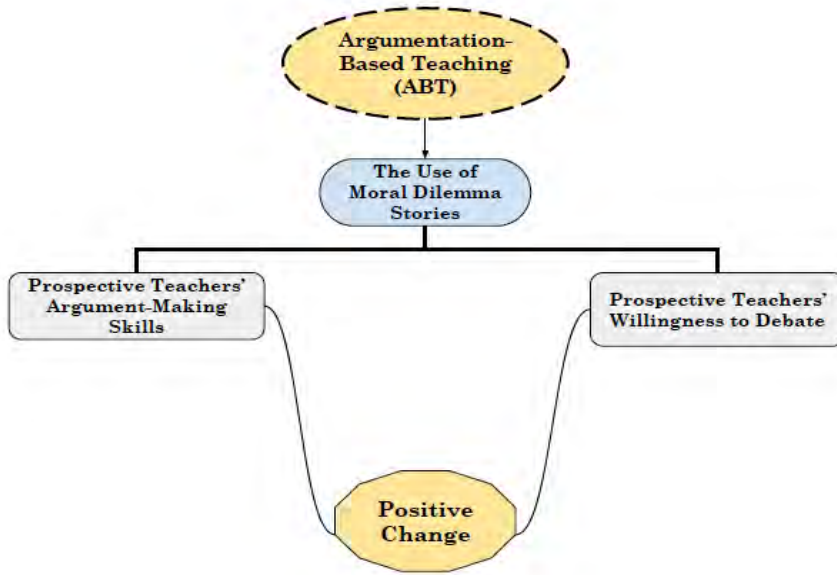


Figure 10. Results of the study

The limitation of this study is that it was carried out in a six-week period and that only four moral dilemma stories were used as an activity to determine the argumentation skills of the prospective teachers.

Considering the findings and results of the research, the following recommendations have been made for researchers and practitioners:

- ✓ Many other studies can be conducted on the ABT and willingness to debate in order to clarify its effect on the willingness to debate.
- ✓ This study was conducted through moral dilemma stories. Similar studies can be conducted on different argumentation scenarios.

- ✓ This study focused on the effect of the ABT method on argument formation and the willingness to debate. Similar studies may be conducted to develop higher-order skills

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