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Investigating Pre-service Gifted Education Teachers' Self-efficacy toward Science Teaching and Scientific Attitudes

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Abstract

Problem Statement: Education of gifted has attracted attention for a few decades. Components of gifted education environments like identification, differentiation of teaching processes, social-emotional characteristics of gifted students and educating teachers of gifted students etc. have been studied in different studies. Gifted students have different learning needs apart from their pers. So teachers of gifted students should master on characteristics of gifted students and learning needs of them. Gifted students have intrinsic interest and motivation toward science and these students need their teachers to guide them effectively. So their teachers should have positive viewpoint and attitudes about science.

Purpose of the Study: The purpose of this study is to explore the pre-service gifted education teachers' self-efficacy toward science teaching and scientific attitudes based on different variables (gender, grade level, etc.) and to assert the relationship between self-efficacy and scientific attitude.

Method: The general model of the research was a quantitative study, and ninety undergraduate students in the Gifted Education program were voluntarily participated in this study. The data were collected by the use of Scientific Attitude Inventory and the Science Teaching Efficacy Belief Instrument. The researcher used an unpaired t-test, analysis of variance and a correlation method to analyze the data.

Findings and Results:: The results indicated that there were significantly positive correlations between grade level and scientific attitude and

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participants' self-efficacy skills for science teaching. In other words, students in higher grade levels show better self-efficacy and scientific attitudes for science teaching than students in lower grades. Additionally, even though the total of self-efficacy points toward science teaching were increased, the outcome expectancy points toward science teaching were not significantly increased.

Conclusions and Recommendations: It is concluded that pre-service gifted teachers' scientific attitudes and self-efficacy toward scince teaching affect each other and correlate positively. In this regard, educational settings that provide effective opportunities to positively increase students' both self-efficacy beliefs toward science teaching and scientific attitudes should be organized.

Keywords: Gifted student, pre-service teacher, scientific attitude, self-efficacy

Introduction

Gifted education has recently received more attention through published research geared toward understanding the importance of teaching gifted and talented students for nations and humanity. In particular, the high level of interest, curiosity, and motivation of gifted students toward science education (Smutny & Von Fremd, 2004) shows that their education should be different from typical students. VanTassel-Baska & Stambaugh (2006) indicate that science positively shapes gifted students' minds more than any other educational field. Therefore, gifted students need to improve their skills in science and science-related processes. Gifted education teachers should learn to effectively guide these students. Renzulli (1968) and Sisk (1989) state that teachers who are trained in identification and differentiated instruction play an important role in the preparation of learning environments that meet the special needs of such students. Teachers who understand and respond to the needs of gifted students are necessary in the field of science. Fundamentally, these teachers must have adequate training and competence in the field, understand individual differences, exhibit self-esteem, have flexibility in the use of resources, creativity and open-minded skills, and be able to support students' self-esteem skills (Strip & Hirsch, 2000; VanTassel-Baska & Stambaugh, 2006). The most fundamental characteristics of teachers that affect their competence in the field of science are a sense of self-efficacy and their own attitudes toward science.

Bandura defines self-efficacy as the beliefs and judgments of individuals in successfully overcoming situations faced by individuals independently (1977). He asserts that individuals who have a high level of self-efficacy are more determined, more disposed, confront difficulties, and feel less anxiety while performing a task. On the other hand, individuals who have low self-efficacy are more likely to refrain from activities, quickly give up on a task, and experience more anxiety and stress. Bandura states that self-efficacy has two sub-dimensions: (a) personal self-efficacy and (b) outcome expectancy. Personal self-efficacy is defined as individuals' beliefs about whether they successfully show necessary behaviors to get desired results.

Outcome expectancy predicts potential consequences of behaviors shown to get desired results. Tschannen-Moran and Woolfolk-Hoy (1998) address questions for two sub-dimensions of self-efficacy to clarify their own definitions. In this regard, the question for personal self-efficacy is, 'Do I have enough capacity to achieve a given task in the desired level?', whereas the outcome expectancy question is, 'What will be the possible consequences if I achieve the task in the desired level?'

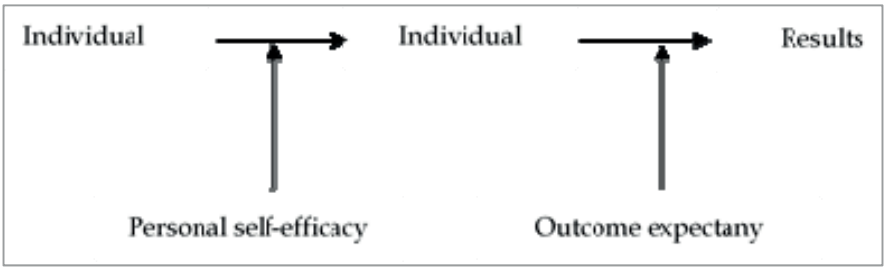

Figure 1. Self-efficacy Belief Schema (Bandura, 1977)

Overcoming the deficiencies and inadequacies in relation to teacher training and education and effective methods for training qualified teachers is extremely valuable for teacher training programs. Thus, it is important to determine teachers' self-efficacy levels. The self-efficacy beliefs of teachers can be defined as judgments of their capabilities to cause desired outcomes of students' learning and progress, even among students who are difficult or unmotivated (Tschannen-Moran and Woolfolk-Hoy, 2001; 1998). Teachers' characteristics, strategies, methods, techniques, and judgments about content knowledge for differentiation provide important feedback on the effectiveness of current teacher training programs and provide ideas to reconstruct these programs.

Studies show there are differences among teachers who have high versus low self-efficacy beliefs, in terms of managing classrooms, using new methods in teaching, giving feedback to students who have learning difficulties, being open to new ideas, and developing attitudes toward students. This directly affects students' success and attitudes (Gibson & Dembo, 1984; Tschannen-Moran & Woolfolk, 1998). Therefore, it is inevitable that teachers' self-efficacy affects attitudes and performances of both teachers and students at all levels of education (Altınok, 2004).

Demirel (1993) defines attitude as a learned tendency that shows certain behaviors toward people, objects, and situations. Attitude is not an observable behavior; instead, it is a preparatory act. The integration of science into everyday life is facilitated by the dissemination of scientific literacy, recognition of the use of science in daily life, and having a positive attitude toward the subject. According to the International Encyclopedia of Education, scientific attitudes include both positive and negative feelings about science subjects (Uluçınar-Sağır, 2012). Scientific attitudes consist of, in general, the impact of science on society, the attitudes toward a scientist and his or her research, and an appreciation for the subject. Thus, understanding the whole of teaching science is crucial; furthermore, researching and

directing people conducting research is a necessity of a positive scientific attitude. Especially, teachers in elementary education who develop and maintain positive attitudes toward science are important since attitudes and values are formed at an early age. As a result, many studies have focused on teachers' attitudes toward science courses, self-efficacy beliefs, and performances affecting students' attitudes, self-efficacy beliefs, and performances (Altınok, 2004; Morell & Lederman, 1998; Palmer, 2001). Therefore, developing positive attitudes toward science by teachers in science education is especially important for their students to develop the same beliefs.

It is crucial to investigate teachers' self-efficacy beliefs and attitudes and investigate their variability based on different variables with gifted students who have curiosity, instinct, and innate interest for science and who are considered potential future scientists. There are limited studies of teacher training programs that provide an effective and appropriate education to gifted students in Turkey; such studies are needed. Toward this end, this research aims to explore the pre-service gifted education teachers' self-efficacy toward science teaching and scientific attitudes based on different variables (gender, grade level, etc.) and to ascertain the relationship between two variables: self-efficacy and scientific attitude. In this study, the following research questions are addressed: (a) What is the extent of self-efficacy toward science teaching and what are the scientific attitudes of pre-service gifted education teachers? (b) How is self-efficacy toward science teaching and scientific attitudes of pre-service gifted education teachers affected by student gender and grade level? and (c) Is there any relation between self-efficacy toward science teaching and scientific attitudes of pre-service gifted education teachers?

Method

Research Design

This study is structured using a relational survey method. This method is used to determine whether there is a differentiation between at least two variables, but a correlation model investigates whether these variables change together. If there is a change between variables, this model determines how this change occurs (Karasar, 2005).

Participants

In this study, participants included volunteer education teachers (n=90) in first, third, and fourth grade pre-service gifted classes, who were enrolled in education in one of universities in Turkey. As seen in Table 1, 61.1% of participants were female (n=55), whereas 38.9% were male (n=35). Additionally, 38.9% of the students were in the first grade (n=35); 27.8% were in the third grade (n=25); and 33% were in fourth grade (n=30).

Research Instruments

The Scientific Attitude Inventory (SAI). The Scientific Attitude Inventory (SAI), developed by Moore and Foy (1997), was used to measure students' scientific attitude levels in this study. Demirbaş and Yağbasan (2006) translated the SAI into Turkish and checked its reliability and validity. This scale consists of 40 items. Each item was ranked along a five point Likert-scale: "strongly agree", "agree", "neutral/undecided", "disagree", and "strongly disagree". For this scale, there were 20 positive and 20 negative items and total points ranged between 40 and 200. The reliability and validity results of this inventory conducted by Demirbaş and Yağbasan (2006) showed that the reliability of this inventory was .76 (Cronbach's alpha); however, for this study we found .70 reliability.

Science Teaching Efficacy Belief Instrument (STEBI): The second instrument used in our study was the Science Teaching Efficacy Belief Instrument developed by Enochs and Riggs (1990) in order to determine the levels of students' self-efficacy beliefs. Özkan, Tekkaya and Çakıroğlu (2002) translated and adapted this scale into Turkish. STEBI had two sub-dimensions: (a) Personal Science Teaching Efficacy Belief Scale ((PSTEBI)-self-efficacy dimension) and (b) Science Teaching Outcome Expectancy Scale ((STOES)-outcome expectancy dimension). This scale consists of 23 items. Each item is ranked along a five point Likert-scale; "strongly agree", "agree", "neutral/undecided", "disagree", and "strongly disagree". Cronbach's α of the original scale for personal science teaching efficacy belief scale and science teaching outcome expectancy scale were reported as .90 and .76, respectively. For the 2002 Turkish version, α scores were .79 and .86 (Özkan, Tekkaya and Çakıroğlu, 2002), and finally, for this particular study, α= .82 and .68.

Data Analysis

In this study, gender, grade level, and other demographic variables were collected on a student information form. Scientific Attitude Inventory and Science Teaching Efficacy Belief Instrument points and information in the student information form were analyzed by using independent samples t-test, a one way analysis of variance (ANOVA) and correlations.

Results

In Table 1, Scientific Attitude Inventory and the Science Teaching Efficacy Belief Instrument results based on gender were provided. Using the five point Likert scale, for each interval (5-1=4) the calculated coefficient unit was .80 (4/5=.80). These intervals were arranged as 1.00 - 1.79, "strongly disagree"; 1.80-2.59, "disagree"; 2.60-3.39, "neutral/undecided"; 3.40-4.19, "agree"; and 4.20-5.00, "strongly agree" (Tekin, 1993).

Table 1.

The SAI and STEBI Results Based on Gender

Gender	Variables	N	Mean	S.D.
Female	**SAI**	55	139.11*	12.35
	PSTEBI	55	45.60*	6.57
	STOES	55	33.09**	4.53
	STEBI	55	78.69**	9.21
Male	**SAI**	35	138.50*	11.03
	PSTEBI	35	43.17**	7.33
	STOES	35	33.26**	4.71
	STEBI	35	76.43**	9.20

*Note. *Agree, ** Neutral/Undecided*

Students' average points from the sum total of SAI and STEBI, all grade levels were presented in Table 2.

Table 2.

The SAI and STEBI Results Based on Grade Levels

Grade Levels	Variables	N	Mean	S.D.
1	**SAI**	35	136.26*	10.46
	PSTEBI	35	43.06**	7.10
	STOES	35	32.09**	4.44
	STEBI	35	75.14**	8.75
3	**SAI**	25	136.32*	11.03
	PSTEBI	25	44.00**	7.33
	STOES	25	33.36**	4.71
	STEBI	25	77.36**	9.20
4	**SAI**	30	144.07*	11.03
	PSTEBI	30	47.07*	7.33
	STOES	30	34.23**	4.71
	STEBI	30	81.30*	9.20

*Note. *Agree, ** Neutral/Undecided*

In Table 1, according to students' SAI scores, the average scores for both male and female students were in the "agree" level of the scale. On the other hand, both male and female students were in the "neutral/undecided" level for STEBI. Investigating sub-dimensions of STEBI showed that female students were in the "agree" level, despite the fact that male students were located in the "neutral/undecided" level for Personal Science Teaching Efficacy Belief. Additionally, both female and male students fell into the "neutral/undecided" level for Science Teaching Outcome Expectancy. Therefore, it can be said that both female and male students were at a good level (agree) for scientific attitude, and a middle level (undecided) of self-efficacy belief in science teaching.

In Table 2, according to students' average points from the sum total of SAI and STEBI, all grade levels were located in the "agree" level for SAI. Additionally, the investigation of STEBI based on grade levels showed that fourth grade students were in the "agree" level while first and third grade students fit into the "neutral/undecided" level. The average points of first and third grade students were in the "neutral/undecided" level, but fourth grade students were in the "agree" level for PSTEBI. On the other hand, all students were located in "neutral/undecided" level for STOES. According to these results, although all grade level students were at a good (agree) scientific attitude level, the first and third grade students were in the middle (undecided) level, and the fourth grade students ranked in the good (agree) level for science teaching efficacy belief.

As provided in Table 3, a t-test was used to determine whether there were significant differences between female and male students in terms of pre-service gifted education teachers' SAI, PSTEBI, STOES, and STEBI results.

Table 3.

The t-Test Results of SAI, PSTEBI, STOES, and STEBI Based on Gender

	Gender	N	Mean	S.D.	*df*	T	p
SAI	Female	55	139.11	12.35	88	.232	.997
	Male	35	138.51	11.03			
PSTEBI	Female	55	45.60	6.57	88	1.634	.811
	Male	35	43.17	7.33			
STOES	Female	55	33.09	4.53	88	-.167	.829
	Male	35	33.26	4.7			
STEBI	Female	55	78.69	9.21	88	1.136	.791
	Male	35	76.43	9.20			

According to the results presented in Table 3, there were no significant differences between female and male students in terms of SAI, PSTEBI, STOES, and STEBI (t_{SAI}=0.232, p>.05; t_{PSTEBI}=1.634, p>.05; t_{STOES}=-0.167, p>.05; t_{STEBI}=1.136, p>.05).

A one-way ANOVA was used to determine whether there were significant differences among the grade levels of students in terms of pre-service gifted education teachers' SAI, PSTEBI, STOES, and STEBI results, as shown in Table 4.

Table 4.

The one-way ANOVA Results of SAI, PSTEBI, STOES, and STEBI Based on Grade Levels

	Source	Sum of Squares	*df*	Mean of Squares	F	p	Sig.
SAI	Between Group	1211.663	2	605.832	4.713	.011	4-1, 4-3
	Within Group	11183.992	87	128.552			
	Total	12395.656	89				
PSTEBI	Between Group	315.191	2	137.285	2.977	.056	-----
	Within Group	6200.711	87	46.112			
	Total	6515.902	89				
STOES	Between Group	75.953	2	37.976	1.844	.164	-----
	Within Group	1791.870	87	20.596			
	Total	1867.822	89				
STEBI	Between Group	619.443	2	309.722	3.871	.025	4-1
	Within Group	6960.346	87	80.004			
	Total	7579.789	89				

According to the ANOVA results, there was a significant difference for SAI among grade levels (F=4.713, p<.05). The Scheffe's Test was conducted in order to determine if the grade levels showed a significant difference. This test concluded that fourth grade students (X= 144.07) showed higher scores than third grade (X= 136.32) and first grade students (X=136.26). Thus, fourth grade students showed better scientific attitude than first and third grade students. On the other hand, there was

not a significant difference among grade levels in terms of PSTEBI and STOES (F_{PSTEBI}=2.977, p>.05; F_{STOES}=1.844, p>.05). STEBI showed a significant difference according to grade levels (F=3.871, p<.05). According to the results of Scheffe's Test that was used to analyze the relationships among grade levels, the STEBI scores of fourth grade students (X= 81.30) were higher than first grade students' scores (X=75.14).

The results of the SAI, PSTEBI, STOES, and STEBI are shown in Table 5.

Table 5.

The Correlation between SAI, PSTEBI, STOES, and STEBI

	1	2	3	4
SAI	--			
PSTEBI	.52*	--		
STOES	.27*	.25	--	
STEBI	.52*	.87*	.68*	--

*Note. * p<.01,*

In Table 5, according to the correlation results, there was a significant moderate correlation between the total of SAI and STEBI value (r=.52) and SAI and PSTEBI (r=.52) at .01 *p*-value. Additionally, there was a significant weak correlation between SAI and STOES at .01 *p*-value (r=.27).

Discussion and Conclusion

The results of this study showed that the scientific attitude of pre-service gifted education teachers was not affected by gender. However, in terms of grade level, scientific attitude became more positive in the higher grades. These results suggest that pre-service gifted education teachers improve and enrich their scientific attitudes through courses at the undergraduate level-such as Physics, Chemistry, Biology, Scientific Research Methods, Science and Technology Teaching I and II, and Science Lab. Moreover, these teacher candidates appear to be closely interested in the sciences, show more positive attitudes toward sciences and scientists, and understand the impact of science on the society. We know that teachers' scientific attitudes and their attitudes toward science teaching affect not only their teaching performance (Klassen & Tze, 2014), but also their students' performance, success, and attitudes toward science courses (She & Fisher, 2002; Sönmez, 2007; Washton, 1971). Thus, teachers who have positive attitudes toward science and science teaching design a more effective classroom environment, and consequently, students develop positive attitudes toward science, making them more likely to remain in this field of study (Mattern & Schau, 2002). In this regard, it would be appropriate to say that if teachers support gifted students' science interests and motivations, these students

could become better science students. Therefore, it is important that pre-service gifted education teachers should have positive science attitudes and develop this skill in a positive way.

Investigating gifted education teacher candidates' science teaching efficacy beliefs showed that personal science teaching efficacy beliefs did not differed based on gender, but self-efficacy did increase in the upper grades. On the other hand, science teaching outcome expectancy did not significantly differ for gender or grade levels. Additionally, science teaching outcome expectancy was located in the "neutral/undecided" or middle level of the Likert scale. While students have beliefs that show required behavior for reaching desired conclusions in teaching science, they struggle to guess the expected outcomes after implementing these behaviors (teaching science). This result suggests that students have knowledge about what to do in theory, but they could not guess the results because of the lack of opportunity or practice in teaching science. Therefore, in teaching and training programs, it is apparent that science-related and science teaching courses cover theoretical knowledge rather than providing opportunities that help students to see what results occur during practices. Enochs, Scharmann, and Riggs (1995) argue that more experienced teachers in science have higher self-efficacy in science teaching and more positive attitudes about teaching science than those with less experience. Additionally, Palmer (2001) states that the development of teachers' attitudes toward science teaching is affected by efficacy perception, the science-related courses taken during their education, and the teaching methods used in these courses. Enochs and Riggs (1990) assert that teacher trainers should be aware of self-efficacy, and provide practices that positively affect results and self-efficacy expectancies. Therefore, pre-service gifted education teachers should sufficiently practice science activities and gain skills to manage complicated situations in the teacher training programs.

Soprano and Yang (2013) noted that teacher candidates improve their self-efficacy beliefs when real-life, hands-on activities are provided. Therefore, teacher training programs should give candidate teachers opportunities that provide strategies, methods, and techniques for teaching students science. They need to know how to address complex problems in daily life, and how to design a productive teaching environment. In these programs, teacher candidates should encounter daily problem cases, and use higher level thinking skills (critical thinking, creative thinking, decision making, etc.) to experience science and solve problem cases.

According to the aforementioned results and interpretations, affective support programs can be designed to support the emotional competences of pre-service teachers at the undergraduate level (Appleton 2008; Koballa et al. 2008; Shoffner, 2009), and new educational strategies can be developed to improve self-efficacy beliefs (Hoy & Spero, 2005). Furthermore, science teaching should be structured in a way so as to link classroom experiences to daily life, fulfill individual needs, provide effective solutions for problems, and promote collaborative learning. In addition, teachers should learn necessary interventions for managing how to encourage and create a deep desire in students to learn science.

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Üstün Zekalılar Öğretmenliği Adaylarının Fen Öğretimi Öz Yeterlik İnançlarının ve Bilimsel Tutumlarının İncelenmesi

Atıf:

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Özet

Problem Durumu: Üstün zekalıların eğitimi son dönemde üzerinde titizlikle çalışılan konulardan birisi olmuştur. Özellikle üstün zekalıların tanılanması, eğitim süreçlerindeki farklılaştırmalar, üstün zekalı öğrencilere eğitim verecek öğretmenlerin özellikleri ve eğitilmeleri vb. gibi konular daha çok ön plana çıkmaktadır. Üstün zekalıların yaşıtlarına göre daha ileride olan kavrayış düzeyleri, üst düzey düşünme becerilerini çok daha erken yaşta, etkili kullanabilmelerini sağlamaktadır. Üstün zekalı öğrencilerin sahip oldukları bu beceriler ile birlikte ileri derecede sahip oldukları içsel merakları da özellikle Fen bilimleri derslerinde daha çok ortaya çıkmakta ve güdülenmektedir. Fen bilimleri dersleri üstün zekalı öğrencilerin dünyaya dair meraklarını ve ilgilerini bilimsel araştırmalar ile giderebilecekleri önemli derslerden biridir. Bu bağlamda üstün öğrencilerin sahip oldukları meraklarını güdüleyerek, onlara bu merak ve ilgilerini sürdürebilecekleri ve bu konularda gerekli öğrenmeleri sağlayabilecekleri öğrenme ortamlarının sağlanması gerekmektedir. İhtiyaçları olan, etkili öğrenme ortamlarının sağlanmasında en etkili rolü öğretmenler üstlenmektedir.

Öğretmenlerin sahip olduğu derse yönelik ilgi, tutum ve öz yeterlik algılarının öğrencilerin dersteki başarı, ilgi ve tutumlarını etkilediği düşünüldüğünde öğretmenlerin o derse yönelik sahip olduğu ilgi, tutum ve öz yeterlik algılarının da belirlenmesi önemlidir. Bireyin farklı durumlarla baş etme, belli bir etkinliği başarma yeteneğine, kapasitesine ilişkin kendini algılayışı olarak tanımlanan öz yeterlik algısı,

kişisel öz-yeterlik algısı ve sonuç beklentisi olmak üzere iki alt boyuta sahiptir. Kişisel öz-yeterlik inancı kişinin istediği bir sonucu yaratabilmek için gerekli davranışları başarıyla gösterip gösteremeyeceğine ilişkin inancıdır. Sonuç beklentisi ise, kişinin yaptığı bir davranışın hangi sonuçları doğurabileceğini yaklaşık olarak tahmin edebilmesidir. Bilimsel tutum ise bireyin bilim ile ilgili sahip olduğu olumlu ve olumsuz duygular olarak tanımlanmaktadır. Yüksek öz yeterlik algısına ve pozitif tutuma sahip olan öğretmenlerin ise, öğrencilerin ihtiyaç duyduğu eğitim ortamlarını hazırlama ve etkili öğrenmenin sağlanma noktasında çok daha başarılı olduğu belirtilmektedir. Bu yüzden öğretmenlerin ya da öğretmen adaylarının sahip olduğu tutum ve öz yeterlik algılarının belirlenmesi ve bu özellikleri geliştirecek ortamların, etkinliklerin ya da eğitimlerin hazırlanması önemlidir.

Araştırmanın Amacı: Bu bağlamda çalışmanın amacı, üstün zekalılar öğretmenliği adaylarının Fen öğretimine yönelik öz yeterlik inançları ile bilimsel tutumlarının farklı değişkenlere (cinsiyet, sınıf düzeyi vb.) göre farklılaşıp farklılaşmadığını ortaya koymak ve bu iki değişken arasındaki (Fen öğretimine yönelik öz yeterlik inancı ile bilimsel tutum) ilişki düzeyini belirlemektir.

Araştırmanın Yöntemi: Çalışma ilişkisel tarama modelinde yapılandırılmıştır. Korelasyon türü ilişkisel taramada, ilişki aramalarda değişkenlerin birlikte değişip değişmedikleri, bir değişme varsa, bunun nasıl olduğu öğrenilmeye çalışılır. Çalışma grubunu, 55'i kız ve 35'i erkek üstün zekalılar öğretmenliği lisans programına devam eden 90 öğrenci oluşturmuştur. Veriler Bilimsel Tutum Ölçeği ve Fen Öğretimi Öz Yeterlik İnanç Ölçeği ile toplanmıştır. Bilimsel Tutum Ölçeği için yapılan geçerlik ve güvenirlik analizleri sonucunda, ölçeğin cronbach alfa güvenirlik katsayısı 0.76 olarak bulunurken; mevcut çalışma için cronbach alfa güvenirlik katsayısı 0.70 bulunmuştur. Fen Öğretimi Öz Yeterlik İnanç Ölçeği "Fen Öğretiminde Kişisel Öz Yeterlik İnancı (FÖKÖYİ)" ve "Fen Öğretiminde Sonuç Beklentisi (FÖSB)" olmak üzere iki alt boyuttan oluşmaktadır. Ölçeğin orijinal halindeki cronbach α katsayısı Fen Öğretiminde Kişisel Öz Yeterlik İnancı ve Fen Öğretiminde Sonuç Beklentisi alt boyutları için sırası ile 0.90 ve 0.76 olup mevcut çalışmada ise sırası ile 0.82 ve 0.68 olarak bulunmuştur. Verilerin analizinde bağımsız gruplar için t testi, ANOVA ve korelasyon analizleri kullanılmıştır.

Araştırmanın Bulguları: Araştırma bulgularından, üstün zekalılar öğretmenliği adaylarının sahip olduğu bilimsel tutum puanlarına bakıldığında, bilimsel tutum puanlarının cinsiyet açısından farklılık göstermediği ve iyi düzeyde olduğu; sınıf değişkeni açısından her sınıf düzeyinde de iyi olduğu ve sınıf düzeyi arttıkça bilimsel tutumun da olumlu yönde arttığı ortaya koyulmuştur. Üstün zekalılar öğretmenliği adaylarının Fen Öğretimi Öz Yeterlik İnançlarına bakıldığında, Fen Öğretimine Yönelik Kişisel Öz Yeterlik alt boyutunun cinsiyet açısından değişmediği; sınıf düzeyi arttıkça inancın da olumlu yönde arttığı gözlenmiştir. Fen Öğretiminde Sonuç beklentisi alt boyutuna bakıldığında ise hem cinsiyet hem de sınıf düzeyi açısından farklılık olmadığı, puanların anlamlı olarak değişmediği, "kararsızım" yani orta düzeyde kaldığı ortaya çıkmıştır. Ayrıca araştırma

bulgularından, öğrencilerin Bilimsel Tutum ve Fen Öğretimine Yönelik Öz Yeterlik İnançları değişkenleri arasında pozitif yönde anlamlı bir ilişkinin varlığı ortaya koyulmuştur.

Araştırmanın Sonuçları ve Önerileri: Araştırma bulguları sonucunda, üstün zekalılar öğretmenliği adaylarının bilimsel tutumlarını, lisans düzeyinde aldığı ve içeriği ile bilime/fene daha yakın olan derslerinin içerikleri ile zenginleştirdiği ve her sınıf düzeyine alınan farklı derslerle geliştirdiği söylenebilir. Üstün zekalı ve yetenekli öğrencilerin sahip olduğu fen öğretimine yönelik öz yeterlik algıları bulgularından ise, öğrencilerin lisans düzeyinde fen öğretimi ile ilgili istediği sonucu yaratabilmesi için gerekli davranışları başarı ile gösterebileceğine inancının olduğu; fakat bu davranışları uyguladığında hangi sonuçların ortaya çıkabileceğini tahmin etmesi noktasında sıkıntı yaşadığı söylenebilir. Öğrencilerin teorik olarak yeterli bilgi ve becerilere sahip olduğunu düşündüğü ama uygulama fırsatı bulamadığı için bu bilgi ve becerileri uyguladığında nasıl bir sonuç ile karşılaşacağı noktasında sıkıntı yaşadıkları söylenebilir. Bu bağlamda genel olarak öğrencilerin hem bilimsel tutumlarını hem de fen öğretimi öz yeterlik inançlarını olumlu yönde geliştirecek, işbirlikli çalışmaları da destekleyen, günlük hayattan seçilmiş, sorgulayıcı temelli olan ve uygulama fırsatlarının sunulduğu eğitim ortamlarının hazırlanması önerilmiştir.

Anahtar Sözcükler: Üstün zekalı öğrenci, öğretmen adayı, bilimsel tutum, öz yeterlik algısı