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Examining Self-Efficacy Beliefs and Attitudes of Pre-Service Science Teachers' and Pedogogical Proficiency Students' Towards Science Teaching Profession

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ABSTRACT

The aim of this study was to examine self–efficacy beliefs and attitudes of pre-service science teachers and pedogogical proficiency students towards science teaching profession. Also, we aimed to measure participants' beliefs and attitudes towards science teaching profession related to some variables like gender, age, graduation field, educational background and having a job. The study consisted of 85 pre-service science teachers and 58 pedogogical proficiency students, in total 143 participants. The data were obtained through "the Scale of Self efficacy Belief in Science Teaching" and "Science Teaching Attitude Scale". The results of the study showed that pedogogical proficiency students had the same level of self-efficacy beliefs and attitudes towards science teaching profession as the pre -service science teachers. The reason for this finding may be due to the lack of motivation or interest to the courses related to the teaching profession taught in educational faculties. Also it was found that neither of pedogogical proficiency students' nor pre -service science teachers' self-efficacy beliefs towards science teaching profession did not differ significantly based on their gender, educational background, graduation field and having job or not.

Keywords: Self-efficacy beliefs; attitudes; pre-service science teachers; pedagogical proficiency students; science teaching profession

Fen Bilgisi Öğretmen Adaylarının ve Pedagojik Formasyon Öğrencilerinin Fen Bilgisi Öğretmenlik Mesleğine İlişkin Öz-yeterlik İnançlarının ve Tutumlarının İncelenmesi

ÖZ

Bu çalışmanın amacı fen bilgisi öğretmen adaylarının ve pedagojik formasyon programındaki öğretmen adaylarının fen bilgisi öğretmenlik mesleğine ilişkin öz yeterlik inançlarını ve tutumlarını incelemektir. Ayrıcabu çalışmada katılımcıların fen bilgisi öğretmenliğine ilişkin inanç ve tutumlarının cinsiyet, yaş, mezuniyet alanı, eğitim geçmişi gibi çeşitli değişkenlere göre değerlendirilmesi amaçlanmıştır. Çalışma 85 fen bilgisi öğretmen adayı ve 58 pedagojik formasyon öğrencisi olmak üzere toplam 143 katılımcı içermektedir. Çalışmanın verileri "Fen Bilgisi Öğretimi Özyeterlik İnancı Ölçeği" ve "Fen Öğretimi Tutum Ölçeği" aracılığıyla toplanmıştır. Çalışmanın sonuçları, fen bilgisi öğretmen adaylarının ve pedagojik formasyon programındaki öğretmen adaylarının fen bilgisi öğretmenlik mesleğine ilişkin öz yeterlik inançlarının ve tutumlarının benzer seviyede olduğunu göstermiştir. Bu sonuç, eğitim fakültelerinde öğrenim gören öğretmen adaylarının derslere olan ilgi ve motivasyonlarının yeterli olmamasından kaynaklı olabilir. Bununla birlikte ne fen bilgisi öğretmen adaylarının ne de pedagojik formasyon programındaki öğretmen adaylarının fen bilgisi öğretmenliğine ilişkin inanç ve tutumlarının cinsiyet, yaş, mezuniyet alanı, eğitim geçmişi gibi çeşitli değişkenlere gore anlamlı bir farklılık göstermediği bulgulanmıştır.

Anahtar Kelimeler: Özyeterlik İnançları, tutum, Fen bilgisi öğretmen adayları, pedagojik formasyon öğrencileri, fen bilgisi öğretmenliği

1. Introduction

The teaching profession is still the most important profession in the world. Because teachers are the people who guide society. They shape the social life by transferring culture of the community to the future generation and by ensuring the development of society. Teachers are the people who build bridges from students' present life to their future life and this continues after students have left the school. Therefore, teaching profession is more than just a job. As noted by Bernhardt (2012: 5) "teaching is not just a 'job' and 'school' is not simply a place where teachers go for ten hours each day; it is a way of life". For this reason, teachers are requires a combination of hundreds of qualities that allow them do their job well and be a good teacher.

A teacher's belief and attitude determines the quality of teacher profession as well as adequate pedagogical and content knowledge. It can be concluded that teachers' belief and attitude towards teaching are the most important determinants of teaching. Teacher self-efficacy is meant as teachers' belief in his or her own ability in order to influence student performances and learning activities successfully (Ashton, 1984). Teachers' self-efficacy directly affect their behavior in class. Attitude is the persons' positive or negative emotional tendency towards any object, event or situation (İpek & Bayraktar, 2004). Attitude towards science is defined as investigating living and inanimate entitities in nature and understanding them then evaluating and describing the findings (Duban & Gökçakan, 2012). The studies had been done confirmed that there was a positive relationship between the achievements of students and teachers' self efficacy beliefs and attitudes towards teaching. Investigating pre-service teachers' self-efficacy beliefs and their attitudes should be investigated whether they are are low or not and teacher education programs should be planned with regard to this. Because it is difficult to change peoples' beliefs and manners after they established in person (Bandura, 1997). For this reason, it is important to investigate the teachers' and teacher candidates' who will become teachers in the future self-efficacy beliefs and attitudes. The aim of this study, therefore, is to fill the gap in the literature by examining self–efficacy beliefs and attitudes towards science teaching profession of pre-service science teachers and pedogogical proficiency students.

Literature Review

Teachers' Self-Efficacy Beliefs in Teaching

Teachers' self-efficacy refers to the teachers' beliefs in their capacity to plan, organize and performe activities in teaching in order to achieve the educational objectives (Skaalvik & Skaalvik, 2010). According to Tschannen-Moran and Woolfolk Hoy (2001: 783), teacher self-efficacy is "teacher's judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated." Thus, the self- efficacy of teachers in teaching profession affects classroom environment. Teachers who have high occupational self-efficacy put more effort to solve the problems that they face (Tschannen-Moran, Woolfok Hoy & Hoy, 1998). Also those teachers tend to quide their students and to motivate them to make their best effort. Because people with high efficacy beliefs are more likely to take control of their actions, undertake tasks and make their own decisions to shape their lives. Individuals with strong self-efficacy not avoid difficult tasks (DeVellis & DeVellis, 2000). On the other hand, teachers who report levels of low self- efficacy have classroom management problems (Dickle et al., 2014). Low self-efficacy lead people to avoid challenging tasks and pursuing their goals (Bandura, 1994). There have been a great number of studies in the literature have focused on the effects of teachers' self- efficacy beliefs on teachers' teaching practice, attitudes and classroom behavior.

Teachers' Attitudes Toward Teaching

Attitude is defined as person's positive or negative manner towards an event, a situation or an object (İpek & Bayraktar, 2004). Individuals' attitude regarding their profession affect their success and satisfaction in this profession (Arastaman, 2013). Teachers' attitudes towards teaching profession is as important as teaching. Because attitudes of teachers in teaching play a cruical role to perform their job beter (Erdem, Gezer & Çokadar, 2005). Teachers' professional attitudes influence their behaviors in educational environment therefore it affects students' achievement (Aydın & Tekneci, 2013). Positive attitudes increase students' achievement even negative attitudes decrease their achievement (İlğan, Sevinç & Arı, 2013). Also, positive attitudes facilitates teaching and learning.

Aim of the Study

In the present research, we focus on the relationship between pre-service science teachers' and pedogogical proficiency students' self–efficacy beliefs and attitudes towards

science teaching profession. Also we aimed to measure participants' beliefs and attitudes towards science teaching profession related to some variables like gender, age, graduation field, educational background and having a job.

Research Questions

- Is there a significant difference between the pre-service science teachers' and pedogogical proficiency students'
  - self–efficacy beliefs towards science teaching profession?
  - attitudes towards science teaching profession?
- Do pre-service science teachers' and pedogogical proficiency students' self–efficacy beliefs towards science teaching differ depending on demographical variables?
- Do pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching differ depending on demographical variables?

Limitations

In this study, participants' self-efficacy beliefs and attitudes towards science teaching profession assessed via likert-type scale. Thus, the data obtained through scale was limited by participants' willing and their motivation during answering the questionnaire.

2. Method

Participants

The participants of the study consists of 85 pre-service science teachers and 58 pedogogical proficiency students, in total 143 participants.

Measures

In order to assess pre-service science teachers' and pedogogical proficiency students' self efficacy beliefs towards science teaching, the Scale of Self efficacy Belief in Science Teaching developed by Riggs and Enochs (1990) and adapted to Turkish by Özkan, Tekkaya and Çakıroğlu (2002) was used. The two-factor scale is likert-type and containes 23 items. One of the factor is that related to science teaching self-efficacy and the other factor is that gaining results in science education. The first factor named "Personal Science Teaching Efficacy Belief" has 13 items and the second factor named "Science Teaching Outcome Expectancy" has 10 items. The reliability of first factor was .76 and the reliability of second factor was.90.

In assessing pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching, Science Teaching Attitude Scale (Thompson & Shringley, 1986) was used. Tekkaya, Özkan and Çakıroğlu(2002) adapted scale into Turkish. The scale is likert-type and containes 21 items. The reliability of the scale was calculated for this study again and it was found as .84.

3. Findings

Participants' demographic informations (gender, age, graduation field, educational background and having a job) were presented in Table 1.

Table 1.
Descriptive statistics of participants' general characteristics

Gender	*f*	*%*
Female	104	72.7
Male	39	27.3
Age	*f*	*%*
Between 21-24	86	60.1
Between 25-28	44	30.8
Between 29-32	10	7
33 or above	2	1.4
Graduation field	*f*	*%*
Science &Technology Teaching	85	59.4
Chemistry	23	16.1
Physics	22	15.4
Biology	12	8.4
Educational background	*f*	*%*
Bachelor	130	90.9
Master	13	9.1
Having a job	*f*	*%*
Yes	40	28
No	103	72

As can be seen in Table 1, gender of majority participants were female (72.7% female and 27.3% male). Participants' age: 60.1% were between 21 and 24 years old; 30.8% were between 25 and 28 years old; 7% were between 29-32 and the remaining 1.4% were 33 and above 33 years old. Great majority of the participants (90.9 %) had bachelor's degrees and only 9.1% of them had master degree. The highest percentage of the participants (72%) were unemployed (see participants' demographic details in Table 1).

We used independent sample t-test in analysing the relationship between pre-service science teachers' and pedogogical proficiency students' self–efficacy beliefs towards science teaching profession. The data are shown in Table 2.

Table 2.
Pre-service science teachers' and pedogogical proficiency students' self–efficacy beliefs towards science teaching profession

Participants	N	X	S	sd	t	p
Pre-service science teachers	85	72,7	7.06	140	.167	.868
Pedogogical proficiency students	57	72.9	6,57			

Table 2 told us that p value is (.868) and we can interpret that there is no statistically difference between groups'self-efficacy reagarding science teaching profession.

The relationship between pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession was calculated with independent sample t-test as shown in Table 3.

Table 3.
Pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession

Participants	N	X	S	sd	t	p
Pre-service science teachers	85	67.2	5.65	140	.129	.897
Pedogogical proficiency students	57	67.1	4.45			

It was seen that there was no meaningful change between attitudes of pre-service science teachers and pedogogical proficiency students ($p>.05$).

Whether pre-service science teachers' and pedogogical proficiency students' self-efficacy beliefs towards science teaching profession differ or not according to some demographical variables are presented in Table 4.

Table 4.

Comparison of pre-service science teachers' and pedogogical proficiency students' self-efficacy beliefs towards science teaching profession depending on some demographical variables

Gender	N	X	S	sd	t	p
Female						
Male	39	74.2	4.92			
Age	N	X	S	sd	t	p
Between 21-24	86	71.5	6.93	141	3.03	.003
25 and above	56	74.9	5.82			
Educational background	N	X	S	sd	t	p
Bachelor	130	72.6	6.71	141	.792	.430
Master	13	74.2	8.05			
Having job	N	X	S	sd	t	p
Yes	40	71.9	5.93	141	.964	.337
No	103	73.1	7.14			

According to Table 4, pre- service science teachers' and pedogogical proficiency students' self-efficacy beliefs towards science teaching profession did not differ significantly based on their gender, educational background and having job or not ($p>.05$). There was a statistically significant difference only in their age ($p<.05$).

We used one-way anova to measure pre-service science teachers' and pedogogical proficiency students' self-efficacy beliefs towards science teaching profession according to graduation field and results were showed in Table 5.

Table 5.

Comparison of pre -service science teachers' and pedogogical proficiency students' self-efficacy beliefs towards science teaching profession depending on graduation field

Graduation field	N	X	S	sd	F	p
Science &Technology Teaching	85	72.7	7.06			
Chemistry	23	72.7	6.62			
Physics	22	72.8	7.74	138	.044	.988
Biology	12	73.5	4.18			

The results of Table 5 indicated that pre-service science teachers' and pedogogical proficiency students' self-efficacy beliefs towards science teaching profession did not differ depending on their graduation field (F = .044; p >.05).

In Table 6, independent sample t-test results of pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession depending on some demographical variables could be seen.

Table 6.
Comparison of pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession depending on some demographical variables

Gender	N	X	S	sd	t	p
Female	104	67.9	5.13	141	2.76	.006
Male	39	65.3	4.83			
Age	N	X	S	sd	t	p
Between 21-24	86	67.1	5.89	140	.140	.889
25 and above	56	67.2	3.88			
Educational background	N	X	S	sd	t	p
Bachelor	130	67.1	5.29	141	.289	.773
Master	13	67.6	3.92			
Having job	N	X	S	sd	t	p
Yes	40	67.1	4.18	141	.055	.956
No	103	67.2	5.52			

In table 6, we can see that the pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession did not differ significantly based on their gender, age, educational background and having job (p>.05).

Pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession according to graduation field were presented in Table 7.

Table 7.
Pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession according to graduation field

Graduation field	N	X	S	sd	F	p
Science &Technology Teaching	85	67.2	5.65			
Chemistry	23	68.2	4.62			
				138	.550	.649
Physics	22	66.4	4.68			
Biology	12	66.4	3.47			

We found no significant differences among the groups' attitudes and graduation field.

4. Conclusion and Discussion

In this study, we examined whether pre-service science teachers' and pedogogical proficiency students' self-efficacy beliefs and attitudes are statistically different from each other.

It was seen that there is no difference in the means of two groups' self–efficacy beliefs towards science teaching profession. Both pre-service science teachers' and pedogogical proficiency students' mean scores of self–efficacy beliefs were high (Table 2). This shows that pre-service science teachers' and pedogogical proficiency students' consider themselves competent regarding science teaching. The findings of this study are similar to many other studies (Yaman, Cansüngü Koray & Altunçekiç, 2004). These studies supported our findings that pre-service teachers' self-efficacy in science teaching are quite high. This finding shows that all participants in this study believe that they have ability to teach for science education.

The findings obtained from the analysis showed that pre-service science teachers' and pedogogical proficiency students' attitudes which are being compared are not significantly different. However, attitude scores were high for both pre-service science teachers and pedogogical proficiency student (Table 3). A possible interpretation for this finding is that all participants are interested in science and they love it.

The research findings showed that self-efficacy beliefs of pre- service science teachers and pedogogical proficiency students did not differ significantly in terms of gender, educational background and having job or not. There was a statistically significant difference

only in their age (Table 4). This can be explained by maturity age of older students (age: 25 and above). It can be positive influence in their feelings of competence for this profession.

Both self-efficacy beliefs and attitudes of pre-service science teachers and pedogogical proficiency students towards science teaching profession did not differ depending on their graduation field (Table 5 and Table 7). Also, it revealed that the pre-service science teachers' and pedogogical proficiency students' attitudes towards science teaching profession did not differ significantly based on their gender, age, educational background and having job (Table 6).

The most important finding in this study is that pedogogical proficiency students had the same level of self-efficacy beliefs and attitudes towards science teaching profession as the pre -service science teachers. The reason for pre-service teachers' self-efficacy beliefs are not higher than the self-efficacy beliefs of pedogogical proficiency students may be due to the lack of motivation or interest to the courses related to the teaching profession taught in educational faculties. Some studies which examined self-efficacy beliefs of teachers indicated that self-efficacy beliefs did not change regarding the faculty variable that was paralel to our finding (Gençtürk & Memiş, 2010; Çapri & Çelikkaleli, 2008). On the contrary, self-efficacy beliefs of pre-service teachers were found to be higher than pedogogical proficiency students' beliefs in a study which was conducted by Arastasman (2013).

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