



## An Analysis of the Changes in Pre-service Teachers' Perceptions towards Teacher Self-Efficacy and Academic Self-Efficacy and their Relations with Several Variables\*

Research Article

Hasan Güner BERKANT<sup>1</sup> & Seda BAYSAL<sup>2</sup>

<sup>1</sup> Kahramanmaraş Sütçü İmam University, Faculty of Education, Curriculum and Instruction, Kahramanmaraş, Turkey, ORCID: 0000-0003-0725-6036,

<sup>2</sup> Kahramanmaraş Sütçü İmam University, Faculty of Education, Curriculum and Instruction, Kahramanmaraş, Turkey, ORCID: 0000-0001-5982-7780)

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### ABSTRACT

This research aims to explore the changes in teacher self-efficacy and academic self-efficacy perceptions of pre-service teachers participating in the pedagogical formation education program (PFEP) and their relations with several variables. The research has a relational survey model. The population of the research consists of 1140 pre-service teachers who have received pedagogical formation education at Kahramanmaraş Sütçü İmam University and who graduated from 18 different departments during the spring term of 2015-2016 academic year. The research sample holds a total of 646 pre-test and 450 post-test pre-service teachers who were selected by convenience sampling method. The research has deployed three data collection tools: "Personal Information Form"; "Teacher Self-efficacy Scale" and "Academic Self-Efficacy Scale". The data have been collected in approximately 14 weeks at the beginning and end of the 2015-2016 spring semester. The same scales have been administered to the pre-service teachers at the beginning and end of PFEP. Dependent and independent group t-test, one-way ANOVA, LSD, and correlation analysis were used during the data analysis. Research results have revealed that pre-service teachers' perceptions towards teacher self-efficacy differ in terms of their gender, age, grade point average (GPA) and graduation field; however, no significant difference has been identified in terms of their teaching experience. Besides, the participants' academic self-efficacy perceptions have been found to vary across their gender, age, GPA, teaching experience and graduation field. A decrease in pre-service teachers' academic self-efficacy beliefs has been found at the end of PFEP while no change has been determined for teacher self-efficacy beliefs. A low, reverse and significant relationship has been noted across pre-service teachers' teacher self-efficacy and academic self-efficacy perceptions after PFEP.

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<sup>1</sup> Corresponding author's address: Kahramanmaraş Sütçü İmam University, Faculty of Education, Kahramanmaraş, Turkey

Telephone: +90 0532 506 83 21

Fax: 0 344 300 13 02

e-mail: hgberkant@gmail.com

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**Introduction**

Undoubtedly, teachers are considered as a key component in establishing a sustained approach to all teaching-learning practices. Thus, it is of utmost significant for teachers to have good personal characteristics, philosophical background, skills, expertise, and values in order to make a dramatic contribution to the teaching-learning environment. Successful teachers are mostly trained through effective training programs (Küçükahmet, 2001). In Turkey, countless applications and changes have taken place during the process of teacher training. Although teacher training was performed only in Education Faculties in 1982, teacher training programs have been structured several times with the decision of the Higher Education Institution. Hence, those who are not the graduates of Education Faculty got the chance to be teachers after receiving pedagogical formation education program (PFEP) (YÖK, 1998). PFEP generally consists of theoretical and practical courses related to educational sciences and teaching practices. Sönmez (2007) underpins that teaching profession is a significant occupation that necessitates special knowledge, skills, and interest, and that no one should be allowed to teach without adequate pedagogical training. Therefore, the major aim of the PFEP is to raise teachers with the knowledge, skills, and attitudes concerning general culture, special field education and teaching profession as well as providing the transfer of the knowledge to a real educational environment (MEB, 1998).

One of the consistent measures of teachers' success in teaching-learning process is their belief in their ability to do the job (Abu-Tineh, Khasawneh & Khalaileh, 2011). Teachers who are expected to have personal and professional qualifications should also feel competent enough to perform effective teaching activities for the sake of the students (Genç, 2000) because teaching profession is quite stressful and mostly leads to failure (Prillel-tensky, Neff & Bessell, 2016). At that point, both pre-service teachers and those who are enrolled in PFEP needs to be connected to school and have a sense of self-efficacy for the problems they encounter while teaching (Ryel, Bernsauzen, & van Tassell, 2001). With this in mind, self-efficacy seems to be a key motivating element in identifying as to how teachers see themselves (Arnold, Hascher, Messner, Niggli, Patry & Rahm, 2011). Self-efficacy has been applied to the profession of teaching and the teacher's role within the classroom, and thus ensuring the existence of a growing body of literature in education related to the theoretical foundations asserted by Bandura (1977). Bandura (1977; 1994) defined self-efficacy, which is the facet of social cognitive theory, as the "belief in one's capabilities to organize and execute the courses of action required to produce given attainments". Self-efficacy can be said to be specific to a certain task and context instead of being a common sense of self. Moulding, Stewart and Dunmeyer (2014) have identified self-efficacy as "the teachers' belief in his or her ability to successfully perform the tasks of teaching". According to Tschannen-Moran and Woolfolk-Hoy (1998; 2001), "a teacher's efficacy belief is a 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." Besides, Guskey and Passaro (1994) point out that teacher self-efficacy is "the teacher's belief in his or her self-confidence about executing effective teaching to students".

Bandura (1977) claimed that teachers with a high sense of self-efficacy tend to use complex strategies, and they struggle with the problems as well as being determined to successfully accomplish their tasks; whereas those with a low sense of self-efficacy hold tension, stress, and dissatisfaction feelings and experiences. In this regard, teacher self-efficacy belief is thought to contribute to understanding and improving teacher behaviors (Yılmaz & Gürçay, 2011). Moreover, teachers with an ideal sense of self-efficacy can fulfill the qualifications required by the teaching profession and they are able to cope with the problems they face easily (Berkant, 2017).

Teachers who are convinced about their competency to teach and who think that effective teaching catalyzes students' understanding and learning are also expected to hold a sense of academic self-efficacy with a view to spending more time on academic activities and using the academic aspects of pedagogical knowledge they acquire in the classroom. In this respect, academic self-efficacy is considered as a special field of self-efficacy (Ekici, 2012). Academic self-efficacy is defined as "an individual's judgments of his or her capabilities to perform given actions." (Schunk, 1991; Zimmerman, 1995). Chemers, Hu and Garcia (2001) have noted that students with high academic self-efficacy greatly use effective cognitive strategies in the learning process, manage their time in a more effective way, and they are much better at monitoring and arranging their effort. In other words, academic self-efficacy is in close relation with students' trust in performing academic subjects. Considering academic self-efficacy in terms of teachers, those in high academic self-efficacy levels will be less critical and more optimistic when their students make mistakes (Ashton & Webb, 1986), and they will use more complex instructional techniques through ensuring guidance and orientation for the students. Zimmerman (1995) has depicted some characteristics of academic self-efficacy as following:

- Self-efficacy includes one's capability of performing tasks rather than personal qualities such as one's physical characteristics or psychological traits.
- Self-efficacy beliefs are related to multidimensional fields. To illustrate, mathematical self-efficacy belief is different from that of English.
- Self-efficacy depends on a different context. Students may express a lower sense of self-efficacy in order to learn in competitive classrooms compared to cooperative ones.
- Self-efficacy measures are related to their dependence on performance's mastery criteria rather than normative or other ones.

Tschannen-Moran, Hoy and Hoy (1998) have reported that teachers' academic and self-efficacy beliefs predict their desire and willingness to teach students who experience problems rather than ignoring them. Teacher and academic self-efficacy beliefs also influence teachers' thoughts and emotional reactions. So to speak, teachers with high self-efficacy approach difficult tasks and activities with serenity. In contrast, those with low self-efficacy levels may be exposed to anxiety, stress and depression as well as a narrow vision of how to solve the problems in a best way (Pajares, 2002). Self-efficacy beliefs may powerfully have an impact on the level of achievement that one ultimately wants to achieve. Considering the following literature, pedagogical formation students' perceptions towards teacher and academic self-efficacy may be said to be significant for an effective teaching-learning process.

So far, countless studies have been conducted on teacher self-efficacy and academic self-efficacy perceptions. Bulut and Oral (2011) have determined self-efficacy perceptions of faculty of science, letters, theology and fine arts graduates who continue PFEP towards teaching profession. Berkant (2017) has examined perceived teacher self-efficacy levels of prospective teachers receiving PFEP in terms of several variables. Ekici (2017) has compared self-efficacy beliefs of the prospective pre-school teachers and those who receive PFEP. Rodríguez et al. (2014) have identified possible teacher self-efficacy profiles and possible differences in some affective-motivational variables of students. In her MA thesis, Pappa (2014) has examined teachers' perceptions of student engagement, teachers' self-efficacy beliefs and their interrelation. Tabanlı and Çelik (2013) have analyzed prospective teachers' academic self-efficacy beliefs and teachers' sense of efficacy in terms of gender, having a job or not and department. Klassen and Chiu (2010) have concentrated on the effect of gender, seniority, and job stress on teachers' self-efficacy perceptions. In addition, Özyıldırım (2018) has carried out a comparative study on metacognitive learning strategies and teacher self-efficacy perceptions of PFEP students and faculty of education undergraduate students. Mojavezi and Tamiz (2012) have focused on the influence of teacher self-efficacy on the students' motivation and achievement. Cerit (2011) has explored the relationship between pre-service classroom teachers' self-efficacy beliefs and their classroom

management orientations. Lin, Gorrell and Taylor (2002) have determined whether pre-service teachers' efficacy beliefs are influenced by the context of their academic programs, by their increasing competence and by their experience as teachers. Baleghizadeh and Shakouri (2015) have searched the relation between teacher self-efficacy and teaching styles. As for the studies conducted on academic self-efficacy perception, Marsden, Carroll and Neill (2005) have suggested that academic self-efficacy is one of the variables that determine the inadequate academic behaviors of university students. Schunk and Pajares (2005) have identified the relation between academic self-efficacy and academic achievement, motivation, homework etc. Oğuz (2012) has put forward academic self-efficacy beliefs of prospective classroom teachers in terms of some variables. Chemers, Hu and Garcia (2001) have conducted a longitudinal study in order to examine the impact of academic self-efficacy on students' academic performance, stress and health. Sağır, Bilen and Ercan (2014) have carried out an experimental study and investigated the effects of 'Practice Teaching Courses' on prospective teachers' beliefs related to self-efficacy and their perceptions on teaching in the classroom. Sezgin (2013) has examined the relationship between attitudes towards mathematics, academic self-efficacy and perceived mathematics teacher behaviors in her MA thesis.

As shown above, the relevant literature mostly concentrates on the self-efficacy perceptions of pre-service teachers attending to undergraduate programs at the faculty of education. Apart from the related literature, the present study focuses on pre-service students attending to PFEP. In Turkey, the duration of this program lasts two semesters within eight months for the graduate students. This duration may be considered relatively as a short period to gain required self-efficacy perception to be a successful teacher in comparison with the students who attend at least four years to one of the undergraduate teacher education program of faculty of education. Despite this short period, it is expected to be gained required self-efficacy perception from the PFEP. The studies conducted on the self-efficacy perceptions of the students who receive PFEP are limited. Moreover, with all the growing interest in the teachers' self-efficacy perceptions and academic self-efficacy separately in many countries, there is not much discussion on the connection to be made between teacher self-efficacy and academic self-efficacy beliefs. To date, there is less evidence or reported study exploring the relationship between pedagogical students' teacher self-efficacy and academic self-efficacy perceptions (Tabancalı & Çelik, 2013). Besides, Bandura (1977) reported that individuals' self-efficacy trends predict their future actions in almost all parts of their lives, so it is essential for prospective teachers to hold positive and strong self-efficacy perceptions. The results of the study are expected to provide various recommendations for raising the self-efficacy perception levels of the pedagogical formation students. Within this context, the research problem statement is as such: "Do pre-service teachers' perceptions towards teacher self-efficacy and academic self-efficacy differ after the PFEP and have relations with several variables?"

### **Aim of Research**

This research aims to explore the changes in teacher self-efficacy and academic self-efficacy perceptions of pre-service teachers participating in the PFEP and their relations with several variables. In service of this goal, answers to the following questions have been sought:

1. Do pre-service teachers' perceptions of teacher self-efficacy significantly differ before and after PFEP across their; gender, age, grade point average (GPA), teaching experience, graduation field?
2. Do pre-service teachers' perceptions of academic self-efficacy significantly differ before and after PFEP across their; gender, age, GPA, teaching experience, graduation field?
3. Do pre-service teachers' perceptions of academic self-efficacy and teacher self-efficacy significantly vary before and after PFEP?
4. Is there a significant relationship between pre-service teachers' perceptions of academic self-efficacy and teacher self-efficacy before and after PFEP?

## Method

This section holds the information concerning the research model, population and sample, data collection tools and data analysis.

### Research Design

Having analyzed the changes in pre-service teachers' academic self-efficacy and teacher self-efficacy perceptions before and after PFEP and their relations with several variables, this research has a relational survey model. Survey models are research models aiming to describe a situation existing in the past or current (Neumann, 2006), and relational survey models are those that aim to identify the relationships among variables or to determine the existence and/or degree of changes between two or more variables (Sönmez & Alacapınar, 2011).

### Population and Sample

The population of the research consists of 1140 pre-service teachers who have received PFEP at Kahramanmaraş Sütçü İmam University and who graduated from 18 different departments during the spring term of 2015-2016 academic year. The research sample holds a total of 646 pre-test and 450 post-test pre-service teachers who were selected by convenience sampling method. The reason of using this sampling method is that the data were collected from the students who attended to the faculty in which the researchers work. The decrease in the number of sample during the implementation of post-test was due to pre-service teachers' absenteeism in an unpredictable way. Table 1 depicts descriptive statistics regarding the participants.

**Table 1.** Descriptive Statistics Regarding the Participants

| Variable            |               | Before education |      | After education |      |
|---------------------|---------------|------------------|------|-----------------|------|
|                     |               | N                | %    | N               | %    |
| Gender              | Female        | 383              | 59.3 | 262             | 59.4 |
|                     | Male          | 259              | 40.1 | 179             | 40.6 |
|                     | Total         | 642              | 100  | 441             | 100  |
| Age                 | 20-24         | 342              | 59.5 | 224             | 62.4 |
|                     | 25 and over   | 233              | 40.5 | 135             | 37.6 |
|                     | Total         | 575              | 100  | 359             | 100  |
| GPA                 | 1.00-2.00     | 67               | 13.5 | 27              | 8.8  |
|                     | 2.01-3.00     | 282              | 57.0 | 189             | 61.7 |
|                     | 3.01 and over | 146              | 29.5 | 90              | 38.3 |
|                     | Total         | 495              | 100  | 279             | 100  |
| Teaching experience | Experienced   | 79               | 12.5 | 51              | 12   |
|                     | Inexperienced | 553              | 87.5 | 373             | 88   |
|                     | Total         | 632              | 100  | 424             | 100  |
| Field               | MS            | 161              | 25   | 129             | 28.6 |
|                     | TM-TS         | 484              | 75   | 321             | 71.4 |
|                     | Total         | 645              | 100  | 450             | 100  |

MS: Math-Science      TM: Turkish-Math      TS: Turkish-Social

Table 1 displays that the majority of the participants constitute those who are female, whose ages range between 20 and 24, whose GPA varies across 2.01 and 3.00, and whose field is TM-TS with no teaching experience. MS and TM-TS represent the general fields which were chosen by the university students before the university entrance exam.

## Data Collection Tool

The research has deployed three data collection tools: The “Personal Information Form”, “Teacher Self-efficacy Scale” and “Academic Self-Efficacy Scale”.

The researchers have developed the "Personal Information Form" with a view to capturing some personal information concerning the pre-service teachers such as gender, age, GPA, teaching experience, and field.

With the goal of determining participants’ perceptions towards teacher self-efficacy, the study has employed the “Teacher Self-efficacy Scale” developed by Tschannen-Moran and Hoy (2001), the Turkish adaptation of which was created by Çapa, Çakıroğlu and Sarıkaya (2005). It is a nine-point Likert-type scale composed of 3 dimensions (student engagement, instructional studies and classroom management) and 24 items. The Cronbach’s alpha reliability coefficient has been identified to be .93 for the overall scale. With the data of present study, Cronbach’s alpha reliability coefficients for the total scale were re-calculated and determined to be .91 for pre-test and .89 for post-test.

The “Academic Self-Efficacy Scale which was developed by Owen and Froman (1988) and adapted by Ekici (2012) was deployed in order to determine the pre-service teachers’ perceptions towards academic self-efficacy. Being a five-point likert-type, the tool has 3 factors and 33 items. The internal consistency coefficient has been found to be 0.86 for the overall scale. For the dimensions—social status, cognitive applications, and technical skills—the coefficients were determined to be 0.88, 0.82, 0.90, respectively (Ekici, 2012). For this study, the coefficients of the total scale have been determined as .90 for pretest and .92 for posttest. Özdamar (2013) has noted that Cronbach’s alpha coefficient should be .60 or higher. On this basis, this reveals that both of the scales are reliable.

## Data Collection and Analysis

The data have been collected twice in 14 weeks of the 2015-2016 spring semester. Pre-service teachers have received PFEP during this period. The same scales have been administered to the pre-service teachers in their classrooms at the beginning and end of PFEP. The collected data have been analyzed through use of SPSS. First, to confirm whether data provided the general requirements of the parametric tests, the Kolmogorov Smirnov test assessed whether the data were distributed normally. Additionally, the variance’s homogeneity was tested by performing Levene’s test on the analysis of the data obtained in the study. As a result of the analyses, the data demonstrated normal distribution. Dependent and independent group t-test, one-way ANOVA, LSD, and correlation analysis were used during the data analysis. In addition, the effect sizes of the significant differences were calculated. The effect size indicates how much of the total variance depends on the independent variable or factor, and it ranges from 0 to 1.00. The eta square values at .01, .06 and .14 are interpreted as the "small", "medium" and "wide" effect sizes in the same order (Büyüköztürk, Çokluk & Köklü, 2010).

## Findings

This part presents findings obtained after analyzing the data in terms of research questions.

### 1. Findings Related to Pre-service Teachers’ Perceptions towards Teacher Self-Efficacy

Table 2 displays independent samples t-test results of pre-service teachers’ perceptions towards teacher self-efficacy before and after PFEP in terms of gender.

**Table 2.** Independent Samples t-Test Results of the Pre-service Teachers’ Perceptions towards Teacher Self-Efficacy Before and After PFEP in terms of Gender

|                  | Gender | N   | $\bar{X}$ | S    | df  | t     | p     | $\eta^2$ |
|------------------|--------|-----|-----------|------|-----|-------|-------|----------|
| Before education | Female | 383 | 166.7     | 22.8 | 640 | -3.05 | .002* | 0.01     |
|                  | Male   | 259 | 172.3     | 22.7 |     |       |       |          |
| After education  | Female | 262 | 170.1     | 22.1 | 439 | -0.12 | .902  | -        |
|                  | Male   | 179 | 170.4     | 26.5 |     |       |       |          |

As shown in Table 2, upon analyzing pre-service teachers’ perceptions towards teacher self-efficacy before education in terms of gender, a statistically significant difference has been noted in favor of males [ $t_{(640)}=-3.05$ ,  $p < .05$ ]. Given the effect size values, it appears that gender has a low impact with 1% effect size upon teacher self-efficacy perceptions before training. No significant difference has been identified across teacher self-efficacy perceptions after education in terms of gender [ $t_{(439)}=-0.12$ ,  $p > .05$ ].

Independent samples t-test results regarding pre-service teachers’ perceptions towards teacher self-efficacy before and after PFEP in terms of age are presented in Table 3.

**Table 3.** Independent Samples t-Test Results of Pre-Service Teachers’ Perceptions towards Teacher Self-Efficacy Before and After PFEP in terms of Age

|                  | Age         | N   | $\bar{X}$ | S    | df  | t     | p     | $\eta^2$ |
|------------------|-------------|-----|-----------|------|-----|-------|-------|----------|
| Before education | 20-24       | 342 | 169.1     | 22.5 | 573 | -0.64 | .522  | -        |
|                  | 25 and over | 233 | 170.3     | 22.0 |     |       |       |          |
| After education  | 20-24       | 224 | 168.1     | 22.4 | 357 | -2.89 | .004* | 0.02     |
|                  | 25 and over | 135 | 174.9     | 19.6 |     |       |       |          |

\* $p < .05$

As can be seen in Table 3, no significant difference has been identified across pre-service teachers’ perceptions towards teacher self-efficacy before education in terms of their age [ $t_{(573)}=-0.64$ ,  $p > .05$ ]. However, pre-service teachers’ perceptions towards teacher self-efficacy after education significantly vary across their age. Accordingly, the scores point a significant difference in favor of those at the age of 25 and over [ $t_{(357)}=-2.89$ ,  $p < .05$ ]. Considering the effect size, 2% of the observed variance in teacher self-efficacy perception scores may be said to depend on age. Pre-service teachers’ age have a low effect on their perceptions towards teacher self-efficacy after education.

Table 4 presents ANOVA results of pre-service teachers’ perceptions towards teacher self-efficacy before and after PFEP in terms of GPA.

**Table 4.** ANOVA Results of Pre-Service Teachers’ Perceptions towards Teacher Self-Efficacy Before and After PFEP in terms of GPA

|                  | GPA          | N   | $\bar{X}$ | SD   | S.V.        | SS       | df  | MS     | F    | p     | Dif. | $\eta^2$ |
|------------------|--------------|-----|-----------|------|-------------|----------|-----|--------|------|-------|------|----------|
| Before education | (1)1.00-2.00 | 67  | 174.6     | 19.8 | Bet. Groups | 2179.4   | 2   | 1089.7 | 2.25 | .106  |      |          |
|                  | (2)2.01-3.00 | 282 | 168.3     | 21.5 | Wit. Groups | 237339.7 | 492 | 482.3  |      |       |      |          |
|                  | (3)3.01-over | 146 | 170.0     | 23.5 | Total       | 239519.1 | 494 |        |      |       |      |          |
| After education  | (1)1.00-2.00 | 27  | 164.0     | 30.4 | Bet. Groups | 4835.6   | 2   | 2417.8 | 4.45 | .012* | 3>1  | 0.02     |
|                  | (2)2.01-3.00 | 189 | 168.5     | 23.6 | Wit. Groups | 164419.8 | 303 | 542.6  |      |       | 3>2  |          |
|                  | (3)3.01-over | 90  | 176.2     | 20.0 | Total       | 169255.5 | 305 |        |      |       |      |          |

\* $p < .05$

As seen in Table 4, a closer look at pre-service teachers’ teacher self-efficacy perceptions in terms of changes before and after education based on GPA indicates no significant difference before education, but a significant difference after education [ $F(2, 303)=4.45$ ,  $p < .05$ ]. LSD post-hoc test has revealed that participants

with 3.01 and over GPA significantly differ from those who have 1.00-2.00 and 2.01-3.00 GPA. Taking effect size into account, 2% of the observed variance in teacher self-efficacy perception scores may depend on GPA after education. The participants' GPA has a low effect upon their teacher self-efficacy perceptions after PFEP.

Table 5 depicts independent samples t-test results with regard to pre-service teachers' teacher self-efficacy perceptions before and after PFEP in terms of their teaching experience.

**Table 5.** Independent Samples t-Test Results of Pre-Service Teachers' Teacher Self-Efficacy Perceptions Before and After PFEP in terms of Teaching Experience

| Teaching Experience |     | N   | $\bar{X}$ | S    | df  | t     | p    |
|---------------------|-----|-----|-----------|------|-----|-------|------|
| Before education    | Yes | 79  | 171.1     | 21.1 | 630 | 0.81  | .415 |
|                     | No  | 553 | 168.8     | 23.1 |     |       |      |
| After education     | Yes | 51  | 169.1     | 33.4 | 422 | -0.27 | .786 |
|                     | No  | 373 | 170.5     | 22.4 |     |       |      |

Table 5 shows that pre-service teachers' perceptions towards teacher self-efficacy do not significantly vary across their teaching experience both before [ $t_{(639)}=0.81, p> .05$ ] and after [ $t_{(422)}= -0.27, p> .05$ ] PFEP.

Table 6 demonstrates independent samples t-test results concerning pre-service teachers' perceptions towards teacher self-efficacy before and after PFEP in terms of their graduation fields.

**Table 6.** Independent Samples t-Test Results of Pre-Service Teachers' Teacher Self-Efficacy Perceptions Before and After PFEP in terms of Graduation Field

| Graduation Field |       | N   | $\bar{X}$ | S    | df  | t     | p     | $\eta^2$ |
|------------------|-------|-----|-----------|------|-----|-------|-------|----------|
| Before education | MS    | 161 | 167.7     | 21.7 | 643 | -0.74 | .457  | -        |
|                  | TM-TS | 484 | 169.2     | 23.3 |     |       |       |          |
| After education  | MS    | 129 | 165.7     | 26.2 | 448 | -2.58 | .010* | 0.01     |
|                  | TM-TS | 321 | 172.1     | 22.7 |     |       |       |          |

\* $p< .05$  MS: Math-Science TM: Turkish-Math TS: Turkish-Social

As can be seen in Table 6, teacher self-efficacy perceptions of pre-service teachers are free from a significant difference before PFEP in terms of their graduation field [ $t_{(643)}=-0.74, p> .05$ ]. However, teacher self-efficacy perceptions of pre-service teachers who graduated from TM-TS field have been determined to be higher after formation education compared to those whose field is MS [ $t_{(448)}= -2.58, p< .05$ ]. Considering the effect size, 1% of the observed variance in teacher self-efficacy perception scores may depend on graduation field after education. The participants' graduation field seems to have a low effect on their teacher self-efficacy perception after PFEP.

## 2. Findings Related to Pre-service Teachers' Academic Self-Efficacy Perceptions

Table 7 presents independent samples t-test results of pre-service teachers' academic self-efficacy perceptions before and after PFEP in terms of gender.

**Table 7.** Independent Samples t-Test Results of Pre-Service Teachers' Academic Self-Efficacy Perceptions Before and After PFEP in terms of Gender

| Gender           |        | N   | $\bar{X}$ | S    | df  | t    | p     | $\eta^2$ |
|------------------|--------|-----|-----------|------|-----|------|-------|----------|
| Before education | Female | 383 | 97.9      | 20.2 | 640 | 2.10 | .035* | 0.007    |
|                  | Male   | 259 | 94.4      | 21.3 |     |      |       |          |
| After education  | Female | 262 | 91.4      | 20.2 | 439 | -.12 | .902  | -        |
|                  | Male   | 179 | 92.7      | 21.5 |     |      |       |          |

\* $p< .05$

As shown in Table 7, upon analyzing pre-service teachers' perceptions towards academic self-efficacy before education in terms of gender, a statistically significant difference has been noted in favor of females [ $t_{(640)}=2.10, p < .05$ ]. Given the effect size value, it seems that gender has a low impact with 0.7% effect size on academic self-efficacy perceptions before training. On the other hand, participants' academic self-efficacy perceptions are free from any difference in terms of gender after education [ $t_{(439)}=-.12, p > .05$ ].

Independent samples t-test results concerning pre-service teachers' academic self-efficacy perceptions before and after PFEP in terms of age are presented in Table 8.

**Table 8.** Independent Samples t-Test Results of Pre-service Teachers' Academic Self-Efficacy Perceptions Before and After PFEP in terms of Age

|                  | Age         | N   | $\bar{X}$ | S    | df  | t      | p    |
|------------------|-------------|-----|-----------|------|-----|--------|------|
| Before education | 20-24       | 342 | 97.9      | 21.1 | 573 | 1.54   | .124 |
|                  | 25 and over | 233 | 95.2      | 20.6 |     |        |      |
| After education  | 20-24       | 224 | 92.7      | 20.3 | 357 | -0.068 | .946 |
|                  | 25 and over | 135 | 92.9      | 21.0 |     |        |      |

Table 8 suggests that pre-service teachers' academic self-efficacy perceptions do not significantly differ across their age before [ $t_{(573)}=1.54, p > .05$ ] and after [ $t_{(357)}= -0.068, p > .05$ ] PFEP.

Table 9 presents ANOVA results of pre-service teachers' academic self-efficacy perceptions before and after PFEP across their GPA.

**Table 9.** ANOVA Results of Pre-Service Teachers' Academic Self-Efficacy Perceptions Before and After PFEP in terms of GPA

|                  | GPA          | N   | $\bar{X}$ | SD   | S.V.     | SS       | df  | MS     | F     | p    | Dif. | $\eta^2$ |
|------------------|--------------|-----|-----------|------|----------|----------|-----|--------|-------|------|------|----------|
| Before education | (1)1.00-2.00 | 67  | 87.9      | 17.2 | Bet. Gr. | 10274.2  | 2   | 5137.1 | 11.82 | .00* | 2>1  | 0.04     |
|                  | (2)2.01-3.00 | 282 | 96.0      | 20.0 | Wit. Gr. | 213667.8 | 492 | 434.2  |       |      |      |          |
|                  | (3)3.01&over | 146 | 102.5     | 23.6 | Total    | 223942.1 | 494 |        |       |      |      |          |
| After Education  | (1)1.00-2.00 | 27  | 104.1     | 19.9 | Bet. Gr. | 5485.8   | 2   | 2742.9 | 6.62  | .00* | 3>1  | 0.04     |
|                  | (2)2.01-3.00 | 189 | 92.2      | 18.9 | Wit. Gr. | 125501.1 | 303 | 414.1  |       |      |      |          |
|                  | (3)3.01&over | 90  | 87.9      | 23.1 | Total    | 130986.9 | 305 |        |       |      |      |          |

\* $p < .05$

Table 9 shows a statistically significant difference between pre-service teachers' academic self-efficacy perceptions in terms of their GPA before PFEP [ $F(2, 492)=11.82, p < .05$ ]. Taking effect size into consideration, GPA has a low impact with 4% effect size upon pre-service teachers' academic self-efficacy perceptions before PFEP. LSD test has concluded that the difference is in favor of those with 3.01 and over GPA as opposed to those who have 1.00-2.00 and 2.01-3.00. Furthermore, the participants with 2.01-3.00 have significantly higher academic self-efficacy perceptions than those of with 1.00-2.00. A similar layout has been noted with respect to pre-service teachers' academic self-efficacy perceptions in terms of their GPA after PFEP [ $F(2, 303)=6.62, p < .05$ ]. LSD test results have indicated that participants with 3.01 and over GPA ( $\bar{X}=87.9$ ) have higher self-efficacy perception compared to those with 1.00-2.00 and 2.01-3.00. Taking effect size into consideration, GPA has a low impact with 4% effect size upon pre-service teachers' academic self-efficacy perceptions after PFEP.

Table 10 presents independent samples t-test results with respect to pre-service teachers' academic self-efficacy perceptions before and after PFEP in terms of their teaching experience.

**Table 10.** Independent Samples t-Test Results of Pre-Service Teachers' Academic Self-Efficacy Perceptions Before and After PFEP in terms of Teaching Experience

| Teaching Experience |     | N   | $\bar{X}$ | S    | df  | t     | p     | $\eta^2$ |
|---------------------|-----|-----|-----------|------|-----|-------|-------|----------|
| Before education    | Yes | 79  | 91.9      | 21.1 | 630 | -2.15 | .032* | 0.007    |
|                     | No  | 553 | 97.2      | 20.6 |     |       |       |          |
| After education     | Yes | 51  | 92.7      | 27.1 | 422 | 0.28  | .777  |          |
|                     | No  | 373 | 91.6      | 19.9 |     |       |       |          |

\*p&lt; .05

As can be seen in Table 10, a significant difference has been noted in favor of participants with no teaching experience compared to those with experience before receiving PFEP [ $t_{(630)}=-2.15$ ,  $p< .05$ ]. Eta-square test points that teaching experience has a low impact with 0.7% effect size upon pre-service teachers' academic self-efficacy perceptions before education. As for post-education, no significant difference has been determined across pre-service teachers' academic self-efficacy perceptions in terms of teaching experience [ $t_{(422)}=0.28$ ,  $p> .05$ ].

Table 11 suggests independent samples t-test results related to pre-service teachers' academic self-efficacy perceptions before and after PFEP in terms of their graduation fields.

**Table 11.** Independent Samples t-Test Results of Pre-Service Teachers' Academic Self-Efficacy Perceptions Before and After PFEP in terms of Graduation Field

| Field            |       | N   | $\bar{X}$ | S    | df  | t    | p     | $\eta^2$ |
|------------------|-------|-----|-----------|------|-----|------|-------|----------|
| Before education | MS    | 161 | 97.1      | 20.2 | 643 | 0.39 | .691  | -        |
|                  | TM-TS | 484 | 96.4      | 20.9 |     |      |       |          |
| After education  | MS    | 129 | 101.5     | 20.1 | 448 | 6.54 | .000* | 0.08     |
|                  | TM-TS | 321 | 87.9      | 19.6 |     |      |       |          |

\*p&lt; .05

MS: Math-Science

TM: Turkish-Math

TS: Turkish-Social

As seen in Table 11, no significant difference has been noted across academic self-efficacy perceptions before PFEP in terms of graduation field [ $t_{(643)}=.39$ ,  $p> .05$ ], while academic self-efficacy perceptions of pre-service teachers who graduated from MS have been concluded to be higher as opposed to those whose field is TM-TS after formation education [ $t_{(448)}=6.54$ ,  $p< .05$ ]. Besides, graduation field appears to have a medium level impact with %8 effect size on academic self-efficacy perception after receiving PFEP.

Paired samples t-test results regarding the change in pre-service teachers' academic self-efficacy perceptions before and after PFEP are shown in Table 12.

**Table 12.** Paired Samples t-Test Results of the Change in Pre-Service Teachers' Academic Self-Efficacy Perceptions Before and After PFEP

| Academic self-efficacy perception | N   | $\bar{X}$ | S    | df  | t    | p     | $\eta^2$ |
|-----------------------------------|-----|-----------|------|-----|------|-------|----------|
| Before education                  | 450 | 98.3      | 21.2 | 449 | 5.13 | .000* | 0.06     |
| After education                   | 450 | 91.8      | 20.7 |     |      |       |          |

\*p&lt; .05

As indicated in Table 12, pre-service teachers' academic self-efficacy perceptions have been exposed to a significant decrease after PFEP [ $t_{(449)}=5.13$ ,  $p< .05$ ]. Considering the effect size, it is likely that PFEP has a medium impact with 6% effect size on the decrease of academic self-efficacy perception.

Table 13 presents paired samples t-test results regarding the change in pre-service teachers' teacher self-efficacy perceptions before and after PFEP.

**Table 13.** Paired Samples T-Test Results of the Change in Pre-Service Teachers' Teacher Self-Efficacy Perceptions Before and After PFEP

| Teacher self-efficacy perception | N   | $\bar{X}$ | S    | df  | t     | p    |
|----------------------------------|-----|-----------|------|-----|-------|------|
| Before education                 | 450 | 169.4     | 22.7 | 449 | -.558 | .577 |
| After education                  | 450 | 170.3     | 23.9 |     |       |      |

As observed in Table 13, there exists no significant difference between pre-service teachers' teacher self-efficacy perceptions before and after PFEP [ $t_{(449)} = -.558, p > .05$ ].

The analysis results regarding correlation between pre-service teachers' academic and teacher self-efficacy perceptions before PFEP are presented in Table 14.

**Table 14.** Correlation Analysis Results of the Relation between Pre-Service Teachers' Perceptions towards Teacher and Academic Self-Efficacy Perceptions Before PFEP

|                                            | 1      | 2      |
|--------------------------------------------|--------|--------|
| Pre-service teachers (n=646)               |        |        |
| 1. Academic self-efficacy before education | 1      | -.190* |
| 2. Teacher self-efficacy before education  | -.190* | 1      |

\* $p < .05$

The results in Table 14 reveal a low, reverse and significant relationship between pre-service teachers' teacher self-efficacy and academic self-efficacy perceptions before PFEP [ $r = -.190, p < .05$ ].

The analysis results regarding correlation between pre-service teachers' academic and teacher self-efficacy perceptions after PFEP are given in Table 15.

**Table 15.** Correlation Analysis Results of the Relation between Pre-service Teachers' Academic and Teacher Self-Efficacy Perceptions After PFEP

|                                            | 1      | 2      |
|--------------------------------------------|--------|--------|
| Pre-service teachers (n=450)               |        |        |
| 1. Academic self-efficacy before education | 1      | -.280* |
| 2. Teacher self-efficacy before education  | -.280* | 1      |

\* $p < .05$

Table 15 suggests that there is a low, reverse and significant relationship between pre-service teachers' teacher self-efficacy and academic self-efficacy perceptions after PFEP [ $r = -.280, p < .05$ ].

### Results, Discussion and Recommendations

Based upon the research findings, the following results have been presented:

1. While gender is effective on pre-service teachers' teacher self-efficacy perceptions in favor of males, and on their academic self-efficacy perceptions in favor of females before PFEP, it is not effective after education.

2. Age is not an effective variable on pre-service teachers' academic self-efficacy perceptions before and after PFEP, but it has become effective on their teacher self-efficacy beliefs after PFEP in favor of the pre-service teachers' whose ages are 25 and over. Beside, age is not effective on their teacher self-efficacy beliefs before PFEP.

3. Research results have revealed that teaching experience is not an effective variable on pre-service teachers' teacher self-efficacy beliefs in terms of before and after PFEP. Differently from this result, the pre-service teachers who have not a teaching experience have higher academic self-efficacy before PFEP, but this difference is not observed at the end of PFEP.

4. Pre-service teachers' graduation fields have been found to be effective on their academic and teacher self-efficacy perceptions after PFEP. Accordingly, the participants who have MS graduation field possess higher level of academic self-efficacy after PFEP and those with TM-TS graduation fields have higher teacher self-efficacy beliefs after PFEP. But, graduation field is not an effective variable on their academic and teacher self-efficacy beliefs before PFEP.

5. Although GPA has no effect on pre-service teachers' teacher self-efficacy perceptions before the PFEP, those with higher GPA have higher teacher self-efficacy perceptions after education. Beside, GPA is effective in favor of those with higher GPA on their academic self-efficacy beliefs both before and after PFEP.

6. It has also been identified that pre-service teachers' academic self-efficacy beliefs decrease after PFEP.

7. The PDEF does not change pre-service teachers' teacher self-efficacy perceptions.

8. It is determined that pre-service teachers' academic self-efficacy beliefs and their teacher self-efficacy beliefs may change oppositely before and after PFEP. It means that one of these two variables may increase while the other one decreases, or contrarily one may decrease when the other increases.

In the present study, it is found that male pre-service teachers' teacher self-efficacy perceptions are higher than those of female pre-service teachers' before PFEP. However, male and female pre-service teachers' perceptions towards teacher self-efficacy are similar after PFEP. This is likely due to the fact that female pre-service teachers' awareness towards teaching profession increases after education. This may be explained by Dunning-Kruger effect, showing that individuals evaluate their competency levels higher than the real situation (Dunning & Kruger, 1999). Under investigation, the relevant literature showed various studies claiming that gender does not influence teacher self-efficacy (Altunçekiç, Yaman & Koray, 2005; Bakaç & Özen, 2017; Baykara, 2011; Çakır, Kan & Sünbül, 2006; Gençtürk & Memiş, 2010; Gömleksiz & Serhatlıoğlu, 2013; Tschannan-Moran & Woolfolk-Hoy, 2007). On the other, Klassen and Chiu (2010) have found a significant difference along gender lines and indicated that males have much more positive views than females. Besides, in their studies, Britner and Pajares (2006) and Şeker, Deniz and Görgeç (2005) have noted that women have higher levels of self-efficacy beliefs compared to men.

This research has determined that pre-service teachers' perceptions towards teacher self-efficacy aren't affected from their age before receiving PFEP. This is likely due to the fact that individuals have some difficulties with certain tasks and roles when they are younger, still these difficulties may be less apparent at older ages (Alvarez, Ruble & Bolger, 2001). On the other hand, after PFEP those who are 25 and over years the old have higher teacher self-efficacy perceptions. This result may be derived from the effect of PFEP on those who are older than others. Çocuk et al. (2015) have found that pedagogical formation students' self-efficacy perceptions are not affected by their age. In another study, Kavrayıcı and Bayrak (2016) have also concluded that pre-service teachers' self-efficacy perception scores do not significantly vary across their age.

Ashton (1984) asserts that "...no other teacher characteristic (teacher efficacy) has shown such a consistent relationship to student achievement". This refers to the fact that as students' achievement scores increase during the university years, their self-efficacy perception levels are expected to be higher compared to those who are unsuccessful. In the present study, pre-service teachers with 3.01 and over GPA have higher teacher self-efficacy perceptions than those with lower GPA after receiving PFEP, meaning that students' achievement may become a key indicator of their teacher self-efficacy perceptions because of PFEP. Abdullah et al. (2011) have exhibited the fact that the GPA is a significant predictor of the self-efficacy. Likewise, Alabay (2006), Yenilmez and Kakmacı (2008) and Ekici (2008) have indicated that pre-service teachers' self-efficacy perceptions increase as their GPA increases. On the contrary, Yeşilyurt (2013) has found that pre-service teachers' self-efficacy perceptions do not significantly differ across their achievement scores.

Berkant (2017) has stated that experience is expected to increase success, self-confidence and self-efficacy in teaching profession just as in any profession. However, this research has found that pre-service teachers' self-efficacy perceptions are not affected by their teaching experience both before and after PFEP. This may result from the fact that pre-service teachers' experiences are not significantly correlated with their self-efficacy perceptions as they lack the required teacher characteristics and academic background related to teacher profession. Similarly, Ekici (2006) has conducted another study that questions whether vocational college teachers' teacher self-efficacy perceptions differ depending on their experience or not. The research results have suggested that teachers' teaching experience is not a significant factor for the increase in self-efficacy perceptions. Similar results have emerged in the studies conducted by Celep (2002), Chacon (2005), Gömleksiz and Serhatlıoğlu (2013), Özerkan (2007), Ölmez and Özbaş (2017), Üstüner, Demirtaş, Cömert and Özer (2009). On the other, Klassen and Chiu (2010) have determined that teachers with 23 years teaching experience have higher self-efficacy perception than those with no experience. Likewise, similar results have been identified in other studies carried out by Campbell (1996), Tschannen-Moran and Woolfolk-Hoy (2002), Gençtürk and Memiş (2010), and Yeşilyurt (2013).

The present study has also identified an effect of graduation field on pre-service teachers' teacher self-efficacy perceptions after PFEP in favor of those whose field is TM-TS. This field consists of scientific knowledge mostly related to social sciences. When the theoretical relation of teacher profession with TM-TS field is taken into consideration, the difference based graduation field may be explained by this relation.

Pre-service teachers' academic self-efficacy perceptions have also been examined in terms of the same independent variables. Upon examining pre-service teachers' academic self-efficacy perceptions depending on their gender, this study has found that gender is effective on pre-service teachers' academic self-efficacy perceptions before PFEP. Women have higher academic self-efficacy perception compared to men before the education. This is likely due to the fact that the cognitive and affective characteristics of the women and men are different and that women may take the pre-service education much more serious and in this way they can be better prepared for their profession. Furthermore, this may be explained by female pre-service teachers' high degree of professional self-confidence. On the other hand, this difference has not been found after PFEP. This may be derived from the effect of PFEP on decrease of the relation between gender role and their perceptions. Ateş (2015) has stated that prospective teachers' academic self-efficacy perceptions are affected by their gender. Conversely, Aslan (2017) has found that male teachers' perceptions are higher in terms of academic self-efficacy.

The current study has demonstrated that pre-service teachers' academic self-efficacy perceptions are not affected from their age before and after PFEP. One such study conducted by Ekinçi (2011) has revealed that age is not significantly effective on prospective teachers' academic self-efficacy perceptions. This result is in line with those of the studies on academic self-efficacy (Hackett, Betz, Casas & Rocha-Singh, 1992; Chu, 2003; Savran & Çakıroğlu, 2001; Yalmançı & Aydın, 2014). This may be the indicator of ineffectiveness of different ages on the academic self-efficacy beliefs and PFEP can't change this effectiveness into a meaningful effect. However, a study conducted by Oğuz (2009) has determined that academic self-efficacy beliefs of prospective classroom teachers of above twenty-two years of age are at significantly higher levels than those in an age rank of 20-21.

Past experience, which is among the four key characteristics of self-efficacy perception, includes individuals' own performances and achievement. Therefore, students' achievement may be said to play a significant role in their academic self-efficacy perceptions. Besides, successful students are expected to have higher academic-self-efficacy perception than those who fail in lessons. In parallel to this assumption, this research has found that pre-service teachers' academic self-efficacy perceptions are affected by their GPAs before and after PFEP. Accordingly, the participants with good GPA have higher levels of academic self-

efficacy compared to those having low GPA. Kula and Taşdemir (2013) have reached a similar result in their study.

The present study has revealed that pre-service teachers who have no teaching experience before PFEP have higher academic self-efficacy beliefs. However, teaching experience has been identified to be ineffective on pre-service teachers' academic self-efficacy beliefs after PFEP. The reason may result from the fact that they become much more aware of the need for specialization of teaching through the training and internship they receive during this program. Tabanlı and Çelik (2013) have conducted such a study as to whether prospective teachers' academic self-efficacy perceptions differ across their teaching experience. Research results have revealed no significant difference between academic self-efficacy perceptions in terms of experience.

Last but not least, this research has determined that pre-service teachers' academic self-efficacy perceptions aren't affected from their graduation fields after receiving PFEP, yet this is not the case before PFEP. Accordingly, the participants who have MS graduation field have higher levels of academic self-efficacy compared to those having TM-TS fields. In contrast with this result, as indicated above, those who have TM-TS graduation field have higher teacher self-efficacy beliefs than those having MF graduation field. Academic self-efficacy perception may vary according to the characteristics and quality of undergraduate programs in which the students of PFEP had attended before. In this context, apart from the teacher self-efficacy, the academic self-efficacy perception may correlate positively to the students with MS graduation field in virtue of PFEP. Also, this result may arise from the decrease of the academic self-efficacy perceptions of the pre-service teacher who have TM-TS graduation field after the PFEP. However, in a study conducted by Tabanlı and Çelik (2013), social sciences students have been identified to hold a higher level of academic self-efficacy than those studying mathematics. Similarly, Çakır, Kan and Sünbül (2006) have found that academic self-efficacy perceptions of students in social areas are higher than students in science and mathematics departments. Üstüner, et al. (2009) have pointed out that pre-service teachers' academic self-efficacy perceptions do not significantly vary across their branches.

As a result of the research, pre-service teachers' academic self-efficacy perceptions have been expected to significantly increase after PFEP. However, the participants' academic self-efficacy perceptions have decreased after education. As for their teacher self-efficacy perceptions, there exists no notable change before and after PFEP despite an increase in their perception scores. Thus, it may be wise to mention that PFEP does not affect positively pre-service teachers' academic and teacher self-efficacy beliefs. Moreover PFEP may decrease their academic self-efficacy perceptions. The reasons may be due to the differences between the undergraduate program and PFEP in which the pre-service teacher had attended, relatively shortness and intensity of the PDEP, the teaching quality of the academic staff, the recognition of the teaching profession and difficulties encountered during the education. Başbay, Ünver and Bümen (2009) have determined that PFEP does not lead to a significant difference in the attitudes of the pre-service teachers. Besides, this research has also examined the correlation between pre-service teachers' academic and teacher self-efficacy perceptions, hence found a low, reverse and significant correlation before and after formation education. In other words, as pre-service teachers' perceptions towards teacher self-efficacy increase, their academic self-efficacy perceptions may decrease and vice versa. This result may show a contrast characteristic of academic and teacher self-efficacy perceptions. Unlike the current study, Tabanlı and Çelik (2013) have found a positive, low level relationship between pre-service teachers' academic and teacher self-efficacy beliefs.

Based upon the research results, various recommendations have been provided:

- The present study has suggested that PFEP does not have an effect on teacher self-efficacy perceptions of pre-service teachers. Hence, it may be essential to increase the quality and importance of practical

applications especially of teaching methods and techniques in order to increase teacher self-efficacy perceptions of pre-service teachers.

- The current study has demonstrated that pre-service teachers' academic self-efficacy perceptions decreased after PFEP. In this regard, it may be considered that pre-service teachers be directed to the academic studies related to the teaching profession during the education process.
- PFE is a convened program that lasts a short period of time. Therefore, those attending this education program do not have opportunities for implementing what they have learned, thus the length of the program may be increased in order to ensure effective teaching-learning process.
- In this study, quantitative research method has been used with a view to determining pre-service teachers' two kinds of self-efficacy perceptions. Experimental studies may be conducted to improve academic and teacher self-efficacy perceptions in future studies.

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