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A Study on Teacher Competencies of Pre-service Science Teachers

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Dilek Sultan Acarlı[1*], Melek Yaman Kasap[2]

[1,2]Department of Mathematics and Science Education, Faculty of Education,
Hacettepe University, Ankara, Turkey

Corresponding Author: *dsultan@hacettepe.edu.tr

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Abstract

In this research designed in survey model, teacher competencies of pre-service science teachers were examined under 4 headings including methodological, social, and personal competencies (Frey, 2008). As a data collection tool, a questionnaire consisting of a total of 226 items questioning the areas of competence was used. The sample of the study consisted of 602 pre-service teachers who continued their education in science, mathematics, biology, chemistry, and physics education programs. In general, it was determined that the perceptions of pre-service teachers about their professional competencies were high. Confirmatory factor analysis was performed to determine the compatibility of the four-factor structure of teacher competencies with the sample data. Among the teacher competence areas, path analysis by Frey (2008) was performed to test the status of correlations in the sample. As a result of the path analysis, it was seen that the proposed theoretical model worked largely in the sample. Examining the relationships among the competence areas, it was determined that methodological competence had a very high effect on social competence and a moderate effect on personal competence. It was concluded that the competence related to the teaching process affected social competence at a low level and personal competence at a moderate level. In addition, a very high relationship was calculated between methodological competence and competence areas related to the teaching process.

Keywords: Teacher Competencies, Pre-service Science Teachers, Path Analysis

INTRODUCTION

"Teachers are among the most powerful influences in learning" (Hattie, 2009:238). This inference by Hattie (2009) was obtained as a result of a meta-analysis of more than 800 studies related to student achievement. What many parents, who are unaware of such research results, also attach the most importance to when choosing a school for their children is usually the teaching staff in the school. When it comes to success or failure in national and international exams due to the results of scientific research and the roles and duties assigned to teachers in daily life, teacher qualifications are primarily examined. Although the influence of teachers on student development and achievement is unchallenged (Darling-Hammond, Wise & Klein 2000; Künsting, Billich & Lipowsky, 2009; Rowan, Correnti & Miller, 2002; Terhart, 2010; Maphoso & Mahlo, 2015; Antony & Elangkumaran, 2020; El Islami, Nuangchalerm, & Sjaifuddin 2018; Nuangchalerm & El Islami 2018; Parmin, Nuangchalerm, & El Islami, 2019; Parmin et al 2020; El Islami & Nuangchalerm, 2020; Mnguni et al 2020; Endedijk et al., 2015; Ott et al., 2018). It is quite difficult to give a clear answer to the question of what qualifies a "good teacher". Because according to the changing social conditions and developments, the definition of a good teacher varies. Especially since the 80s, many countries have been looking for an answer to the question 'what qualities should a successful teacher have?' and studies have been carried out to determine the qualifications that teachers should have to contribute to the personal and academic success of students.

Teaching is a specialty profession. However, it is not a profession whose boundaries and rules can be determined with precise lines as in other occupational groups. Although there are some universal rules, standards may vary according to different societies and countries. Societies determine and apply standards related to the teaching profession according to their cultural and social characteristics. However, it is known that in many countries, the qualification frameworks prepared by authorized boards and individuals are generally similar to each other.

The concept of competence is defined as the fact that people have the knowledge, skills, understanding, attitudes, and behaviors necessary for the solution of a problem and the fulfillment of a task or responsibility (Frey, 2004). According to Weinert (2001), competence is the solution of

certain problems with cognitive skills and abilities that are present or can be learned in individuals and the use of these solutions with a sense of success and responsibility in various situations (Weinert, 2001). When it comes to the teaching profession, the concept of competence refers to the knowledge, skills, and attitudes that must be possessed to perform the profession effectively and efficiently (Şişman 2009; Şahin 2004; MofNE, 2006). As it can be understood from the definitions, teacher competencies are not limited to only the knowledge of the field but have a very inclusive content such as field teaching, communication, evaluation, attitudes and values and, personal characteristics. For this reason, it is obvious that the qualifications of the teaching profession will consist of quite long lists. To date, numerous studies have been carried out to determine the definition and framework of teacher competencies (Ashton, Olejnik, Crocker, & McAuliffe, 1982; Ashton & Webb, 1986; Gibson & Dembo, 1984; Tschannen-Moran & Woolfolk-Hoy, 2001). Some of these studies (Lunenberg, 2002; Sönmez, 2003; Sünbül, 2001) deal with teacher competencies in three basic areas (subject area - general culture - teaching profession knowledge), and some of them are classified into two main groups as professional and personal competencies (Şeker et al., 2004).

The teaching profession and its qualifications have always been on the agenda in different periods in Turkey. In recent years, studies on determining competency and qualifications have gained more importance, and various projects have been carried out in this regard in recent years (MofNE, 2017a; Seferoğlu, 2004). The first comprehensive study on the determination of general qualifications in the teaching profession is the Support to Basic Education Project, which was launched in 2002 and supported by the EU. Within the scope of this project, teacher competencies have been determined to realize many objectives such as realizing national cooperation and information sharing more effectively, creating a system that can be compared, and creating a clear, understandable, and reliable source to be used as a basis for teachers' professional development. General competencies of the teaching profession have been explained in 6 main competence areas as Personal and Professional Values– Professional Development, Student Recognition, Learning and Teaching Process, Monitoring and Evaluating Learning, Development, School-Family,

and Community Relations, Program and Content Knowledge, and 31 sub-competencies and 233 performance indicators related to these competencies (MofNE, 2006). In 2008, the European Parliament and the Council of Europe adopted the "European Qualifications Framework". These decisions are advisory, and countries have been asked to establish their own national qualifications within the framework of these qualifications. Following Turkey's adoption of the European Qualifications Framework, the recommended national qualifications framework was developed and the "Turkish Qualifications Framework" entered into force in 2015. In addition, within the scope of the Bologna Process, the "Higher Education Qualifications Framework" was adopted in 2011. In line with the aforementioned developments, it was decided to update the teacher competencies, and the general competencies of the new teaching profession were updated in 2017. With the updates made, separate competencies were not developed for each specific field, but instead field knowledge and field education knowledge were added to the general competencies. Thus, with the latest updates, 11 sub-competencies and 65 performance indicators were determined for the general competencies of the teaching profession, including Professional Knowledge, Professional Skills, and Attitudes, and Values, along with 3 competence areas (Mof NE, 2017a).

The determination of qualifications concerns not only the teachers who continue their teaching services and the Ministry of National Education (MofNE) but also the universities that train pre-service teachers. Because the first step towards becoming a good teacher is through the training of pre-service teachers (Terhart, 2006). For this reason, arrangements were made to align the curriculum of teacher training institutions with the updated teacher competencies (CoHE, 2007; CoHE, 2018). Although the qualification criteria vary from country to country, studies have been carried out in the European Union countries to develop teacher competencies and establish standards within the scope of the Bologna process. The use of these standards is mandatory in some countries while optional in others (European Commission, 2006).

Setting benchmarks is, of course, not enough to make teachers successful. The ability of teachers to meet the high demands expected of them depends on various interacting conditions (Allemann-Ghionda & Terhart, 2006;

Baumert & Kunter, 2006). According to some researchers, individual characteristics such as the suitability of personality traits to the profession, cognitive skills, and social skills are effective in the success of the teacher (Lin, Schwartz & Hatano, 2005). Some researchers argue that the most important factor in teacher success, regardless of individual characteristics, is the education received by pre-service teachers (Darling-Hammond, 2006; Kennedy, Ahn & Choi, 2008). Another approach assumes that both personality traits and educational content contribute to a teacher's professionalism by combining aptitude and adequacy hypotheses (Blömeke, Kaiser & Lehmann, 2008; Fend, 1998). Frey (2002) emphasizes that the areas of field teaching, methodological, personal, and social competence, and their interaction with each other are important and that their interaction is important in teacher success. These fields are defined as follows:

Competence for the Teaching Process: This area of competence forms the basis of professional activities. It is not possible to carry out professional activities without the qualifications of the teaching process. This area of competence includes discipline-oriented, capable areas that require continuity in education and are open to development for a change. Teaching process competencies consist of comprehensive sub-competence areas that include all activities related to the learning and teaching process in the classroom and school environment: Teacher-student interaction, supportive observation, and diagnosis of students, discipline management, encouraging social behavior, supporting learning behaviors, lesson planning, measurement and evaluation, teaching materials and technologies, cooperation in school, school and society, self-organization, curriculum and field teaching are included in this category (Frey, 2008).

Social Competence: Social competence includes areas of ability that enable a person to achieve a goal in cooperation with others and with a sense of responsibility. Depending on the work to be done and the environment, the ability to work independently on the work or parts of the work is also considered in this context. In addition, the skills to ensure that work is effective and efficient by acting constructively and goal-oriented when conflict and problems arise are in this area of competence. Social skills generally include independence, cooperation, a sense of responsibility, openness to

discussion and criticism, communication, leadership, and the ability to act appropriately (Fuhr 1998; Schuler & Barthelme, 1995).

Methodological Competence: Methodological competence includes having effective working methods and thinking skills in the field of discipline in which a teacher works, and being able to develop and use them dynamically. Under this heading, skill areas such as analyzing working methods and conditions, structuring working processes, collaboration, and flexibility are usually listed. This area of competence consists of sub-areas of self-evaluation, analysis, adaptation to changes, purposeful behavior, and working technique (Bader, 2002).

Personal Competence: This area of competence includes the attitudes, skills, and personality characteristics required for individuals to act and motivate responsibly. These are virtues that can also be described as basic moral attitudes. Self-efficacy is related to acting with self-awareness (Frey, 2004), and is covered under the following sub-competence areas (Fuhr, 1998): Helpfulness and empathy, justice and patience, sense of duty, the joy of living, pride, self-appreciation, self-confidence, adaptation to society, orientation to success and curiosity.

The teaching process, methodological, social, and personal competence areas are not independent of each other. These should be seen as interrelated areas that constituted teacher behavior (Frey, 2002; Frey, Balzer & Renold, 2002). Figure 1 presents the hypothetical modeling of these competence areas proposed by Frey (2008) and the theoretical relationships between the competence areas. In the proposed model, it is stated that methodological competence has an effect on social competence and social competence has an effect on personal competence. Competence in relation to the teaching process also has an impact on both social and personal competence. There is also a significant relationship between methodological and teaching process competence (Frey, 2008).

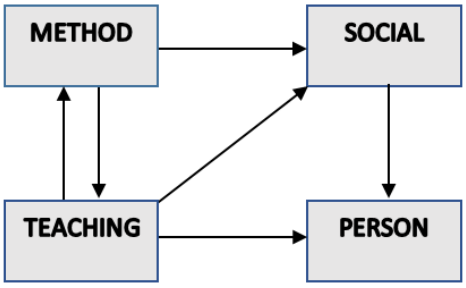

Figure 1. Hypothetical Structural Model of Four Areas of Competence (Frey, 2008)

Considering that the qualification criteria vary from country to country, it will be difficult to prepare and implement the teaching qualification

scale, which can be asked in one session, to the extent that it covers all these. In his study, Frey (2008) collected data from different countries and examined how his proposed model of teacher competencies worked in these countries. Although there have been studies on general teacher competencies in Turkey (Başbay & Bektaş, 2009; Gelen & Özer, 2008; Seferoğlu, 2004; Sünbül & Arslan, 2006; Şişman, 2009; Tuğluk & Kürtmen, 2018; Üstün & Tekin, 2009), there is no study on the interaction of competence areas with each other. For this reason, the teacher competencies model proposed by Frey (2008) was taken into consideration and it was determined how the proposed theoretical structure works in pre-service teachers studying in Turkey. The answers to the following questions were sought in the study:

1. How do science pre-service teachers evaluate their teaching process, methodological, social and personal competencies?
2. How does the proposed theoretical structure for the four competence areas work for the Turkey sample?

METHOD

The research was designed in survey model. In educational research, the survey model is the model in which researchers describe the characteristics of individuals, groups, or the physical environment (Fraenkel, Wallen & Hyun, 2012). In this study, it was tried to determine the status of pre-service teachers in terms of teacher competencies expected from them, and the effect of different competence areas on each other was examined in a theoretical framework.

Participants

The sample of the study consists of 602 pre-service teachers who continue their education in the 3rd and 4th grades in different programs of the Department of Mathematics and Science Education. At the beginning of the study, participants were asked how they evaluated their future professional success in the field they studied. The answers to this question and the demographic information of the sample are presented in Table 1.

Table 1. The frequency of demographic variables

Demographic Variable		f (%)
Gender	Female	468 (%77.7)
	Male	134 (%22.3)
Class	3rd grade	336 (%55.8)
	4th grade	266 (%44.2)
Program	Biology	87 (14.5)
	Chemical	79 (%13.1)
	Physics	58 (%9.6)
	Science	170 (%28.2)
	Mathematics	208 (%34.6)
How do you evaluate your future professional success?	High	16 (%2.7)
	Medium	82 (%13.6)
	Low	504 (%83.7)

Data Collection Tools and Analysis

A questionnaire developed by Frey (2008) was used to collect data. Frey (2008) defined teacher competencies under 4 groups in his study: competence in the teaching process, social competence, methodological competence, and personal competence. Frey (2008) stated that four competence areas are divided into different sub-competence areas within themselves. The survey consists of a total of 226 items questioning these competencies. In the items in the survey, pre-service teachers were asked to evaluate their status of having the said competencies with a 6-item Likert-type rating from "I completely disagree (1)" to "I completely agree (6)". Table 2 provides a sample item for each sub-competence of the 4 competence areas. Average scores at the sub-competence areas were calculated. In the continuation of the study, sub-competencies are discussed as articles that explain the areas of competence.

SPSS 23.0 and LISREL 8.7 software were used for the analysis of the research data. For each of the competence and sub-competence areas, the average score and the standard deviation were calculated. The reliability of the sub-competence areas was tested by calculating the item-total score correlations. It was considered that explaining the relationship between the score from each test item (sub-competence area) and the total score of the test, the item-total score correlations should be positive and greater than 0.3 (Pallant, 2007). To test the consistency between participant responses, Cronbach's alpha (α) reliability was calculated separately for both all competencies and each competency

dimension. It was taken as a criterion that the reliability coefficient is measured as .70 and above (Pallant, 2007). Confirmatory factor analysis was performed to test the appropriateness of the theoretical structure specified for the competence and sub-competence areas in the sample studied. In addition, Path analysis was performed for the sampling suitability of the theoretical model proposed by Frey (2008). X^2/df (Chi-square Goodness of Fit/ degree of freedom), SRMR (Standardized Root Mean Square Residual), RMSEA (Root Mean Square Error of Approximation), AGFI (Adjusted Global Fit Index), NFI (Normed Fit Index), NNFI (Non-Normed Fit Index), CFI (Comparative Fit Index), PGFI (Parsimony Goodness of Fit Index) indices were taken into consideration for DFA and Path analysis by considering the sample size (Chiang & Liu, 2014; Hoe, 2008; Hooper, Coughlan, & Mullen, 2008; Jöreskog & Sörbom, 1993; Sharma et al, 2005; Sümer, 2000, Tabachnick & Fidell, 2007).

RESULTS AND DISCUSSION

In Table 2, mean, standard deviation, and Cronbach's alpha values for teacher competence and sub-competence areas are given. In addition, a sample article describing how many items each sub-qualification consists of and the sub-competence area are given. Thus, the findings are given by summarizing the theoretical structure of the study. It was observed that the item-total correlations calculated for the sub-competence areas received very high values between .529 and .894. Cronbach's alpha value calculated for all 4 competence areas is .97. Cronbach's alpha reliability coefficients, which are calculated separately for each of the competence, social competence, methodological competence, and personal competence areas related to the teaching process, are as follows: .97, .93, .95, .94.

The area in which pre-service teachers receive the highest average score among the competence areas is the personal competence area with 5.21 points, and the competence area where they have the lowest average is the methodological competence area with 4.92 points. When the average scores of the sub-competence areas are examined, it is noteworthy that all of them are above 4.5 (out of 6). Consequently, it can be seen that the perceptions of pre-service teachers about their professional competencies are high.

Table 2. Sample items, reliability, mean, standard deviation and item-total correlation values for the competence and sub-competence areas

Competence and Sub-Competence Areas	Sample Item	$\bar{X}$	ss	Item-Total Correlation
Competence for the Teaching Process (T) ($\bar{X}$=5 ; ss=.638; α=.97)				
T1. Teacher-student interaction (6 items)	Giving students encouraging feedback	5.14	.696	.697
T2. Student supportive observation and diagnosis (5 items)	Diagnosing learning disabilities	4.96	.762	.746
T3. Disciplinary management (4 items)	Streamlining disciplinary issues	4.96	.795	.768
T4. Encouraging social behavior (7 items)	Supporting students in building friendships	4.92	.723	.790
T5. Supporting learning behaviors (11 items)	Practice learning strategies	4.96	.730	.890
T6. Course planning (9 items)	To create a discussion environment between students	5.01	.720	.883
T7. Measurement and assessment (5 items)	To evaluate written and oral studies correctly	5.04	.765	.859
T8. Teaching materials and technologies (6 items)	Taking advantage of new technologies in class	5.11	.782	.837
T9. Cooperation in school (8 items)	Communicating and collaborating with colleagues	4.90	.770	.820
T10. School and society (5 items)	Establishing relationships with the community	5.04	.804	.781
T11. Self-organization (5 items)	Creating a personal development program for himself	4.90	.818	.789
T12. Curriculum (13 items)	Adhering to the lesson plan during the course of the lesson	5.06	.700	.887
T13. Field teaching (10 items)	To apply the field-oriented curriculum to the curriculum in a logical way	5.06	.773	.832
Social competence (S) ($\bar{X}$=4.97; ss=.567; α=.93)				
S1. Independence (6 items)	Taking the initiative	4.65	.761	.529
S2. Cooperation (6 items)	Work efficiently in a group	5.08	.653	.846
S3. Sense of responsibility (6 items)	Acting responsibly	5.12	.667	.832
S4. Being open to discussion and criticism (6 items)	Trying to find a way out of differences of opinion	4.93	.679	.820
S5. Communicaion (6 items)	Expressing yourself clearly and clearly	4.93	.639	.839
S6. Leadership (6 items)	Motivate other people to take responsibility for themselves	4.97	.645	.845
S7. Acting appropriately (6 items)	Demonstrate appropriate attitude and behavior to the situation	5.09	.651	.832
Methodological competence (M) ($\bar{X}$=4.96; ss=.604; α=.95)				
M1. Self-assessment (6 items)	Assessing their own talents	5.04	.672	.833
M2. Ability to analyze (6 items)	Analyze various situations	4.92	.669	.885

Competence and Sub-Competence Areas	Sample Item	$\bar{X}$	ss	Item-Total Correlation
M3. Adaptation to change (6 items)	Reacting to changing conditions without difficulty	4.86	.658	.845
M4. Purposeful behavior (6 items)	Knowing the methods that enable to achieve a goal	4.99	.667	.857
M5. Work-up techniques (6 items)	Using an appropriate working technique in specific work-related situations	4.97	.642	.894
Personal competence (P) ($\bar{X}$=5.25; ss=.605; α=.94)				
P1. Humanitarianism and empathy (9 items)	Helping others	5.40	.701	.807
P2. Justice and patience (5 items)	Being fair	5.42	.683	.764
P3. Sense of task (6 items)	Fulfilling their duties	5.26	.745	.839
P4. Joy of life (5 articles)	Trying to find happiness	5.40	.736	.827
P5. Self-appreciation (4 items)	To be proud of yourself	5.17	.801	.758
P6. Self-confidence (6 items)	Defending one's thinking with endurance	5.20	.719	.786
P7. Adaptation to society (5 items)	Comply with applicable social rules	4.89	.812	.651
P8. Orientation towards success (4 items)	Working hard	5.21	.733	.775
P9. Curiosity (6 items)	Researching	5.34	.660	.796

As a result of the research, it was seen that the pre-service teachers were very confident in the 4 theoretically defined competence areas and that their perception of competence was high. Of course, it is very important and desirable for pre-service teachers to consider themselves competent in terms of professional competencies. The fact that pre-service teachers perceive themselves as sufficient in terms of teacher competencies is a promising situation that increases the expectation that it will be sufficient in the future. However, sometimes individuals' perception of competence can be found at a high level above reality or low below reality (Bandura, 1977). Since students have not yet been confronted with the real situation and practice conditions in the school environment, they may have developed a fairly high sense of positive competence. For this reason, evaluations can be made in terms of different variables or at different time intervals to check whether the competence perceptions of pre-service teachers have changed.

Alkan et al. (2017) reported that teachers' perceptions of competence were also high in their studies with teachers and that this was especially evident in teachers with more professional experience. In some previous studies comparing pre-service teachers and working teachers, it was

reported that pre-service teachers considered themselves more competent than teachers in terms of general competencies in the teaching profession (Gelen & Özer 2008). This has been interpreted as the fact that pre-service teachers are more idealistic, they tend to see themselves as people with the qualifications of their dream profession. On the other hand, it was stated that teachers in the profession considered themselves less competent by making more realistic evaluations. Many researches indicate that the problems experienced by teachers in their professional lives affect their perception and evaluation of their competencies, and link the perception of high competence of pre-service teachers to the fact that they have not yet encountered these problems (Gelen & Özer, 2008; Seferoğlu, 2004). For this reason, when the same questions are asked to pre-service teachers a while after becoming a teacher, the importance of investigating whether there will be a change in their views is emphasized. Because the expectation is that their perceptions will change (Gelen & Özer, 2008). At this point, the importance of ensuring the harmony between theory and practice in teacher education emerges. By increasing the application opportunities for pre-service teachers, it can be ensured that they have more experience with the challenges and requirements of the teaching profession. On the other hand, Şeker et al. (2005) determined that pre-service teachers consider themselves more competent than the school practice teacher in some subjects such as preparing materials, determining appropriate methods and techniques, attracting interest and attention to the lesson, and expressing target behaviors clearly in the practice lessons in schools. The reason for this was reported as the impact of the courses they took during their education, such as Planning and Evaluating Instruction, Instructional Technology, and Material Development. Based on this result, researchers emphasized the importance of teacher education. One of the reasons for the high perception of competence of pre-service teachers in this study may be that the pre-service teachers' education continues and their knowledge is still fresh due to the courses they have taken in this process, and there has not been time since then. At this point, it is seen that the training received by teachers is as important as experience in acquiring teacher competencies. The duration and content of teacher education programs, as well as the talents, qualifications, and expertise of teacher educators, have a significant impact on the quality of teachers. For this reason, the content of

teacher training programs and the qualifications of the academic staff conducting the programs also gain importance. In addition, although teacher competencies are similar in a general framework, different competencies may be needed for different disciplines (MofNE, 2017b). For this reason, it would be useful to determine the teaching profession competencies separately for each specific area. By developing international standards for field-specific qualifications, teachers can have more information about the competencies they need to have in their field and become more aware of what they should pay attention.

In the study, pre-service teachers rated their future professional success as largely medium (%13.6) or low (%83.7) despite their perceptions of high competence (Table 1). The perceptions of high competence of pre-service teachers can also be explained by Bandura (1977)'s definition of competence. According to Bandura (1977)'s definition, teachers must first believe in their own power (self-efficacy) and then try to control the factors that affect the outcome (result-getting effectiveness) to succeed in teaching. The level of possession of these two qualities can be considered as the basic competency criterion of teachers. Bandura's (1977) theory of competence coincides at some point with Rotter's (1966) theory of control focus. Rotter (1966) stated that individuals focus on internal control or external control according to their own will or external factors (luck, bad luck, fate, other people, etc.) for the events they experience. The ability to control environmental factors, which Bandura (1977) calls "outcome effectiveness," will be affected by the internal or external control focus of individuals that Rotter (1966) describes in his theory. In this case, according to the results of the research, the fact that the pre-service teachers' perceptions of competence and their predictions of future success are not compatible can be explained by the fact that they believe that environmental factors will adversely affect them despite trusting their self-efficacy (external control-oriented individual feature).

The model created at the level of competence and sub-competencies as a result of the confirmatory factor analysis conducted to determine the compatibility of the four-factor structure of teacher competencies with the sample data is given in Figure 2.

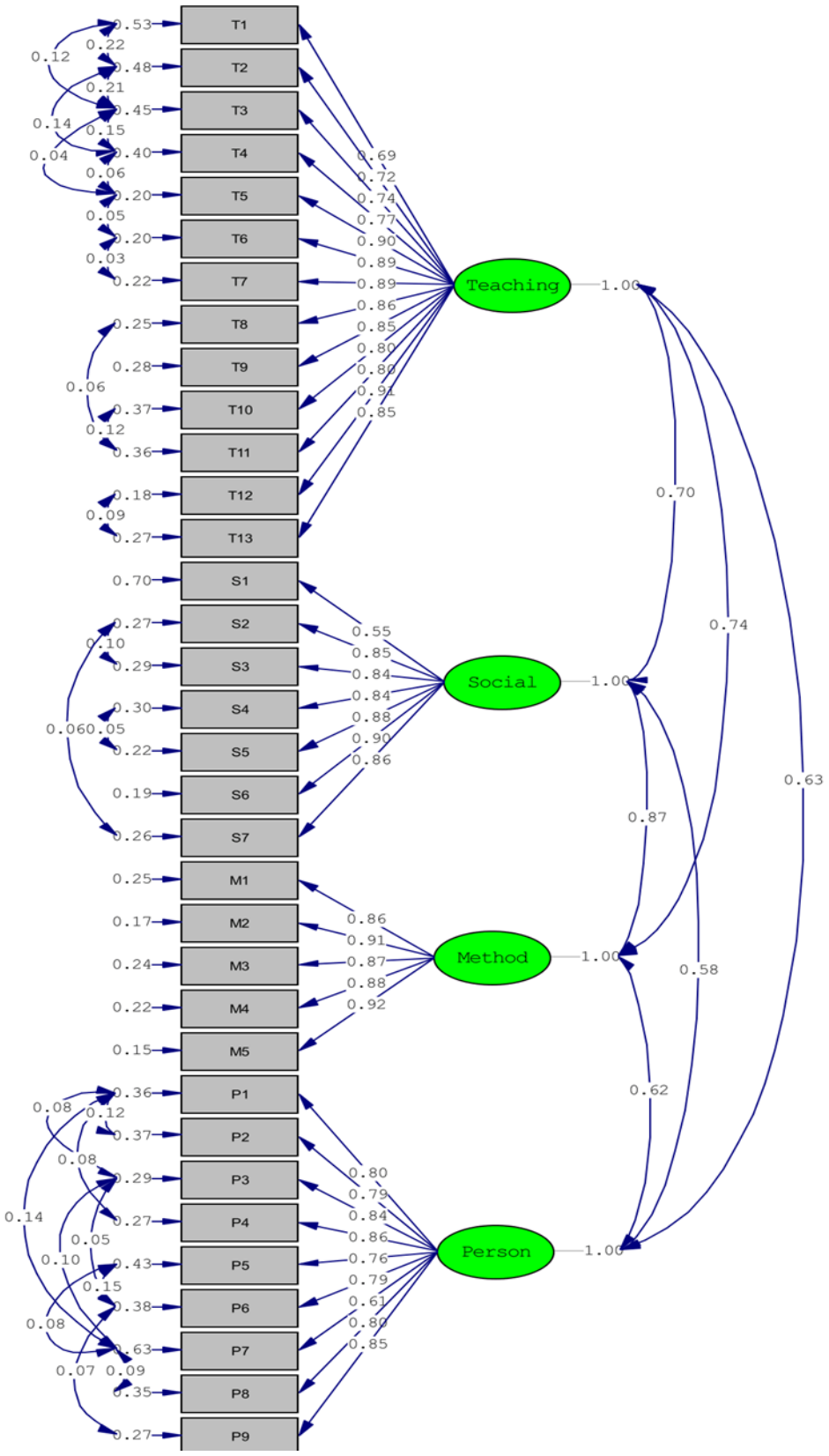

Figure 2. DFA model for Teacher Competencies Scale

When the fit indices calculated for the model were examined, it was observed that the Chi-square goodness fit ($\chi 2$) statistic was significant ($p<.01$). Although it is undesirable for this test to be meaningful, it is suggested that if the sample size is 200 and above, it would be more appropriate to look at the $\chi 2/df$ value (Hoe, 2008; Jöreskog & Sörbom, 1993). In the study, $\chi 2/df$ value was calculated as 2.93 (1448.53/495). A value below 3 is considered a perfect fit for large samples in the field literature (Kline, 2005; Sumer, 2000). In addition, for verification of the model, information was taken into consideration regarding that, in addition to $\chi 2/df$ value, RMSEA value should be .08 and below, AGFI value should be .90 and above, PGFI value should be .50 and above (Chiang & Liu, 2014); SRMR value should be .05 and below (Brown, 2006; Byrne, 1994); and NFI, NNFI, CFI values should be .95 and above (Hu & Bentler, 1999). These values for the model were calculated as follows: RMSEA=0.057, AGFI=0.90, PGFI=0.73, SRMR=0.047, NFI=0.99; NNFI=0.99; CFI=0.99. Considering the criteria and the calculated values for the model, it can be interpreted that the model shows fitness for the sample data. According to the results of the confirmatory factor analysis, the competence factor loads related to the teaching process took a value between .69-.91; social competence factor burdens were calculated as .55-.90; methodological competence factor loads were found to be .86-.92; personal competence was valued at .61-.86. When all these calculated values are taken into consideration, it is seen that the 4-dimensional theoretical structure is confirmed.

Among the teacher competence areas, path analysis was performed to test the status of correlations submitted by Frey (2008) in the sample (Figure 3). As a result of the analysis applied, fit indices of the model were calculated as follows: $X^2/df=3,20$; P-value=0.07381, RMSEA=0.061, AGFI=.97 PGFI=0.10 SRMR=0.010, NFI=1.00; NNFI=0.99; CFI=1.00.

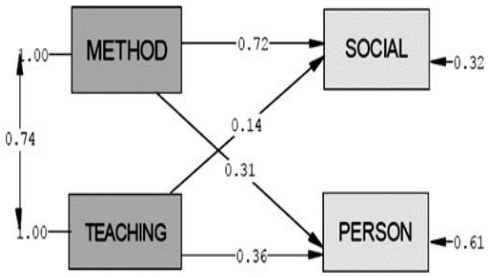

Figure 3. Path Diagram of the Competence Model

When the research findings are examined (Figure 3), it is seen that the high impact of methodological competence on social competence is quite high (.72). When the sub-

competence areas and article contents are examined, it is concluded that being sufficient in self-evaluation, analysis, adaptation to change, purposeful behavior and determining appropriate working techniques also affects competence in social competence areas such as independence, cooperation, responsibility awareness, communication and leadership. The effect of social competence on personal competence in the model proposed by Frey (2008) was found to be insignificant. In other words, in the sample studied, social competence has no effect on personal competence. However, in line with the model recommendations, methodological competence was determined to be a moderate effect on personal competence calculated as .31. Pre-service teachers who think that they are successful in self-evaluation, analysis, adaptation to change, purposeful behavior, and determining appropriate working techniques are also confident in terms of personal competencies such as sense of duty, self-confidence, justice, empathy and adaptation to society.

The competence of pre-service teachers in relation to the teaching process has a low (.14) effect on their social competence and a moderate (.36) effect on their personal competence. In addition, it was determined that there was a significant positive relationship between the competencies related to the teaching process and the methodological competencies (r: .74). Therefore, the high competence of pre-service teachers regarding the teaching process also affects social, personal, and methodological competencies. Therefore, teacher competencies need to be evaluated as a whole. An improvement in one of these areas of competence will have a multifaceted impact on teachers' overall professional competence.

The model validated as a result of analysis is largely similar to the model created by Frey (2008) for German pre-service teachers with a high perception of competence. In German pre-service teachers with a high perception of competence, the effect of social competence on personal competence was meaningless. In this research, it was determined that teachers' perceptions of competence were quite high. Therefore, it can be said that the similarity between the models may be due to the perception of high competence. Although the general framework of teacher qualifications is similar in many countries, there are no specific standards that can be used for all societies and different countries. The mobility of pre-service teachers and teachers within the

scope of lifelong learning programs will enable them to benefit from the experiences of different countries. Identifying their strengths and weaknesses within the framework of different criteria will be beneficial for their professional development and will also provide important data for the provision of international standards on teacher qualifications.

CONCLUSION

In the study, pre-service teachers evaluated their teaching process, social, methodological, and personal competencies quite highly. This result suggests that teacher education is satisfactory in achieving its goals and that the courses taken by the pre-service teachers during their education are effective in their perception of high competence. In this case, the importance of teacher education programs is revealed. In the study, a model showing the effect of different areas of competence on each other was tested for Turkish pre-service teachers. The model was validated. This model indicates that competencies should be evaluated and developed as a whole. An improvement in one of the competence areas will have a multifaceted effect on the general professional competence of teachers. For this reason, the existence of a system where pre-service teachers' and teachers' competencies are regularly measured and feedback is provided, will provide important clues for them to improve themselves according to the results of the evaluation. It is thought that this situation will make positive contributions to the quality of education.

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