

# Evaluation of the Relationship Between Pre-Service Teachers' Pre-Professional Identity Perceptions and Epistemological Beliefs

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Cited:

Yıldırım, R., & Aşçı, M. (2025). Evaluation of the relationship between pre-service teachers' pre-professional identity perceptions and epistemological beliefs. *Journal of Interdisciplinary Educational Research*, 10(3), 460–472. <https://doi.org/10.57135/jier.1715066>

## Abstract

The aim of this study is to evaluate the relationship between pre-service teachers' preprofessional identity perceptions and epistemological beliefs. For this purpose, 1398 pre-service teachers studying at MCBÜ Faculty of Education in the Spring Semester of 2024-2025 Academic Year were identified and 227 pre-service teachers were included in the study group with voluntary participation. The 227 pre-service teachers in the study group met the number of participants required for a 5% margin of error and 90% confidence level in the context of the study population consisting of 1398 pre-service teachers. For the data needed in the study, a personal information form was used in the first part. Through the personal information form, data were collected about the gender of the participants and the undergraduate program they were enrolled in. For the data needed in the study, a personal information form was used in the first part. Through the personal information form, data were collected about the gender of the participants and the undergraduate program they were enrolled in. In the second part, "Epistemological Beliefs Scale" (Akçay, Gezer & Akçay, 2016) was used as a 5-point Likert Rating Scale and in the third part, "Early Teacher Identity Measure" (Arpacı & Bardakçı, 2015) was used. After the collected data were transferred to the computer environment, the data analysis process was started with the SPSS25 package program. The results of the study showed that there was a low-level positive relationship between pre-service teachers' epistemological beliefs and their pre-professional teacher identities.

Keywords: Pre-service teachers, Teacher Identity, Epistemological beliefs

## INTRODUCTION

The teaching profession is one of the most widely recognized professions on a global scale. When the studies on the subject are examined, it is estimated that over 50 million teachers will take office in the next 20 years and the number of teachers on duty will reach approximately 200 million (Billingsley, Griffin, Smith, & Kamman, 2009). From the point of view of training individuals who can adapt to a rapidly changing world, the importance of training teachers with such a large population with the desired quality is obvious. For this reason, the questions about the competencies that prospective teachers should have in the future and how to provide them with these competencies are still the current topics of study in the field of educational sciences. The issue of teacher identity, which has been addressed more frequently by some studies (Reeves, 2018), (Miller, 2009) and (Olsen, 2016), is as important as prospective teachers' content knowledge competencies and general culture competencies.

Identity is an integrity, coherence and continuity formed because of mutual interactions and communication with the whole external environment as well as the internal dynamics of the organism (Izdania, 2014). When the structuring process is examined, it is seen that identity is affected by many factors belonging to cultural, social, and political contexts in people's lives

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(Swaan, Bosson, & Pennebaker 2010; Shoemaker & Tobia, 2019). Teacher identity refers to a personal understanding shaped by how teachers see themselves and who they aspire to become. This identity develops gradually through teaching experiences and professional growth. For pre-service teachers, the shift from their personal identity to a recognized teacher identity is a key part of their training. Reflecting on how they currently view themselves and the kind of teacher they hope to be is an important step in their preparation process.

Pre-service teachers should be given information about the importance and necessity of teacher identity in their education, and the formation they receive should be organized in a way that will help them form a professional identity. It is also a matter of debate to what extent teacher training models should consider the results of scientific studies that emphasize the importance of candidates gaining not only knowledge, values, and attitudes but also a teacher identity, and to what extent these results are reflected in teacher training programs. When the factors affecting teacher identity are examined, it is seen that identity is shaped by personal, psychological, social, early childhood and pre-service education experiences (Barkhuizen, 2019), (Knowles, 1992) (Beijaard, Verloop, & Vermunt, 2000). The fact that the desired level of teacher identity depends on many variables mentioned above shows how complex the process is.

Pre-service teachers are “active players in their own educational processes and some studies (Aydınlı and Avcı 2010) reveal that creating identity for themselves is as important as creating knowledge, not transferring knowledge.

Pre-service teachers' perspectives on knowledge and its construction reflect their epistemological beliefs. Essentially, epistemology is accepted as a theory of knowledge and is a branch of philosophy that reveals the beliefs of individuals about how to access and evaluate scientific knowledge and explains how they construct their own knowledge (Schommer, 1990; Tsai, 2000). The second half of the 20<sup>th</sup> century was the time when the relationship between epistemology and educational issues began to be investigated. Perry (1981) is recognized as the pioneer of the studies linking epistemological beliefs and educational issues. Schommer (1990) explains epistemology as understanding what knowledge is and how knowledge learning takes place. “Innate Ability”, ‘Simple Knowledge’, ‘Fast Learning’, ‘Certain Knowledge’ and ‘Omniscient Knowledge’ are the five dimensions Schommer identifies for epistemological knowledge.

Pre-service teachers' beliefs about how scientific knowledge is constructed and evaluated in their pre-service education are also important in terms of the teacher identities they must develop in the process. Especially their beliefs that knowledge is absolute and unchanging are closely related to who they are and who they want to be in terms of their identities. Brownlee (2014) discussed that the attitudes of pre-service teachers, especially those who are trying to be trained as science educators, towards scientific knowledge instead of the mere transfer of the knowledge they see as unchangeable, which is only produced, is a situation that needs to be considered. It is thought that this problem is closely related to the teacher identities that pre-service teachers will form.

When the related literature is examined, there are some studies (Taşkın, 2013), (Aypay, 2011), (Demir, 2012), (Baltacı, 2013) (Bakır & Adak, 2014) (Gülev, 2015) (Biçer, Hafize, & Özer, 2013) (Gürol, 2010) (Aslan & Aybek, 2018). Frequently, the prominent research topics in the studies conducted in the field of science teaching are the studies that relate pre-service teachers' epistemological beliefs with self-esteem, self-efficacy, educational philosophies they adopt, teaching methods they will apply and different variables. There is no study on the relationship between pre-service teachers' epistemological beliefs and their teacher identities.

### **Purpose of the Research**

The aim of this study is to evaluate pre-service teachers' teacher identities and their epistemological beliefs about scientific knowledge in terms of some variables. In line with this general purpose, answers to the following questions have been sought;

1. What is the level of pre-service teachers' epistemological beliefs?
2. What is the level of pre-service teachers' preprofessional teacher identities?

3. Is there a significant difference in pre-service teachers' epistemological beliefs according to their gender and the undergraduate program they are enrolled in?
4. Is there a significant difference in preprofessional teacher identities of pre-service teachers according to their gender and the undergraduate program they are enrolled in?
5. Is there a significant relationship between pre-service teachers' epistemological beliefs and pre-professional teacher identities?

## METHOD

In this section; study model, study group, data collection tools, data collection process and data analysis are explained.

### Model of the Study

Quantitative research method was used in the study. According to Büyüköztürk et.al. (2013), quantitative research methods enable the researcher to observe, measure, and analyse independently and objectively. Quantitative research methods can be used through two main models: survey and experimental (Şimşek, 2012). The feature of the survey model is that it can describe the situation as it is (Karasar, 2012). The study was conducted according to the relational survey model.

### Study Group

As the study population; 1398 pre-service teachers studying at MCBÜ Faculty of Education in the Spring Semester of 2024-2025 Academic Year were determined. The study group consisted of 227 pre-service teachers with voluntary participation. The 227 pre-service teachers in the study group met the number of participants required for a 5% margin of error and 90% confidence level in the context of the study population of 1398 pre-service teachers (Şahin, 2012). Information about the pre-service teachers in the study group is given in Table 1.

Table 1. Study Group

| Registered Undergraduate Program       | Female | Male | N   |
|--|--------|------|-----|
| Primary school mathematics teaching    | 31     | 5    | 36  |
| Guidance and psychological counselling | 85     | 18   | 103 |
| Primary school teaching                | 44     | 9    | 53  |
| Social studies teaching                | 13     | 6    | 19  |
| Turkish language teaching              | 14     | 2    | 16  |
| Total                                  | 187    | 40   | 227 |

As seen on Table 1, totally 227 pre-service teachers involved in the study. There were 187 female participants, and 40 male participants. Whole participants were from five different teacher education programs.

### Data Collection Tools

The measurement tool used in the study was composed of three sections. In the first part, a personal information form was used. Through the personal information form, data were collected about the gender of the participants and the undergraduate program they were enrolled in.

In the second part, the measurement tool named "Epistemological Beliefs Scale" (Akçay, Gezer & Akçay, 2016) was used as a 5-point Likert Rating Scale. The scale was used to collect information about pre-service teachers' epistemological beliefs. The original version of the scale was developed by Conley, Pintrich, Vekiri & Harrison (2004), translated into Turkish by Özkan (2008) and adapted into Turkish by Akçay, Gezer & Akçay (2016). The final version of the adaptation study, in which 424 pre-service teachers participated, was obtained with 19 items and 3 factors. The factors were named as Justification of knowledge, Source / certainty of knowledge and

Development of knowledge. All the factors explained 47.43% of the total variance. Cronbach's alpha coefficient of the scale was  $\alpha=.853$ . Akçay, Gezer & Akçay (2016) found the values obtained for confirmatory factor analysis (CFA) of the scale they adapted as given in Table 2 and presented the scale for use in related scientific studies.

Table 2. Summary of CFA (Epistemological Beliefs Scale)

| $\chi^2/df$ | $p$     | CFI  | GFI  | AGFI | SRMR | RMSEA |
|-------------|---------|------|------|------|------|-------|
| 2.538       | $p<.01$ | .960 | .910 | .890 | .066 | .060  |

As seen on Table 2 the values show that Epistemological Beliefs Scale can be used for related studies as a data collection tool.

In the third part, the measurement tool named "Early Teacher Identity Measure" (Arpacı & Bardakçı, 2015) was used as a 5-point Likert Rating Scale. The scale was used to collect information about pre-service teachers' preprofessional teacher identities. The original version of the scale was developed by Friesen & Besley (2013) and adapted into Turkish by Arpacı & Bardakçı (2015). The final version of the adaptation study, in which 449 pre-service teachers participated, was obtained with 17 items and 3 factors. The factors were named as Self-categorization as a teacher, Confidence in becoming a teacher and Participation as a teacher. All the factors explained 55.67% of the total variance. Cronbach's alpha coefficient of the scale was obtained as  $\alpha=.930$ . Arpacı & Bardakçı (2015) found the values obtained for confirmatory factor analysis (CFA) of the scale they adapted as given in Table 3 and presented the scale for use in related scientific studies.

Table 3. Summary of CFA (Early Teacher Identity Measure)

| $\chi^2/df$ | $p$     | CFI  | NFI  | NNFI | SRMR | RMSEA |
|-------------|---------|------|------|------|------|-------|
| 3.980       | $p<.01$ | .970 | .960 | .970 | .050 | .080  |

As seen on Table 3, the values show that Early Teacher Identity Measure can be used for related studies as a data collection tool.

### Data Collection Process

Depending on the design of the study, the researchers first searched for measurement tools that could collect data on pre-service teachers' epistemological beliefs and preprofessional teacher identities and decided on the scales included in this study. Then, the academicians who conducted the relevant scale studies were contacted via e-mail and their permission to use the scales was obtained. Subsequently, ethics committee permission was obtained from MCBU Social and Human Sciences Scientific Research and Publication Ethics Committee with the meeting decision dated 24.01.2025 and numbered 2025/01.

The measurement tool, which was designed in three parts as personal information form, epistemological belief scale and preprofessional teacher identity scale before the related permission applications, was started to be applied after the completion of the permission process.

In the data collection process, the measurement tool was converted into a printed form and the data were collected by applying it to the study group formed with the voluntary participation of pre-service teachers.

In this way, a total of 231 data forms were collected. However, during the data entry into the computer environment, 4 forms that were damaged to the extent that they could not be read were detected. The 4 damaged forms were cancelled and the data was entered into the computer environment on the remaining 227 forms and the data collection process was completed.

## Process

After transferring the collected data to the computer environment, the data analysis process was started with the SPSS25 package program.

## Analysis of Data

First, the Kolmogorov Smirnov Normal Distribution Test was applied to the data to decide whether parametric or nonparametric tests should be applied in the analysis of the data.

According to the normal distribution test results of the Epistemological Beliefs Scale;  $p=.036$  ( $p<.05$ ) for the whole scale,  $p=.000$  ( $p<.05$ ) for the “justification of knowledge” dimension,  $p=.006$  ( $p<.05$ ) for the “source/invariance of knowledge” dimension and  $p=.000$  ( $p<.05$ ) for the “development of knowledge” dimension. It was determined that the data belonging to the whole and all sub-dimensions of the Epistemological Beliefs Scale did not show normal distribution.

According to the normal distribution test results of the Pre-Professional Teacher Identity Scale;  $p=.012$  ( $p<.05$ ) for the whole scale,  $p=.010$  ( $p<.05$ ) for the dimension of “Categorizing oneself as a teacher”,  $p=.001$  ( $p<.05$ ) for the dimension of “Confidence in being a teacher” and  $p=.000$  ( $p<.05$ ) for the dimension of “Taking part as a teacher”. It was determined that the data for the whole and all sub-dimensions of the Preprofessional Teacher Identity Scale did not show normal distribution.

According to the Kolmogorov Smirnov Normality Test results, the data did not show normal distribution. It was decided to apply nonparametric tests in the analysis of the data.

The level of pre-service teachers' Epistemological Beliefs and Preprofessional Teacher Identities were revealed by looking at the minimum, maximum, mean ( $\bar{x}$ ) and standard deviation ( $sd$ ) values through diagnostic Statistics.

Then, Mann Whitney U Test was applied to analyse whether the data obtained in accordance with the other sub-problems in the study showed a significant difference according to gender and Kruskal Wallis Test was applied to analyse whether there was a significant difference according to the undergraduate program enrolled.

Finally, the relationship between pre-service teachers' Epistemological Beliefs and Pre-Professional Teacher Identities was analysed with Spearman Rank Difference Correlation Coefficient.

## Results

In this section, the data were analysed in accordance with the order of the sub-problems in the study and the findings obtained are presented.

### Results Related to the First Sub-Problem

The first sub-problem was formulated as “What is the level of pre-service teachers' epistemological beliefs?” and the diagnostic statistics related to the epistemological belief levels of pre-service teachers according to the data obtained are presented in Table 4.

Table 4. Descriptive Statistics of Pre-Service Teachers' Epistemological Belief Levels

| Dimension / Scale                         | N   | Minimum | Maximum | $\bar{x}$ | $sd$ |
|---|-----|---------|---------|-----------|------|
| Justification of knowledge dimension      | 227 | 2.43    | 5.00    | 4.14      | .489 |
| Source / certainty of knowledge dimension | 227 | 1.00    | 3.86    | 2.09      | .659 |
| Development of knowledge dimension        | 227 | 2.20    | 5.00    | 4.03      | .593 |
| Epistemological Belief Scale              | 227 | 2.26    | 4.47    | 3.36      | .364 |

As seen on Table 4, the pre-service teachers evaluated all the questions of the Epistemological Belief Scale with an arithmetic mean score of 3.36 (somewhat agree). The lowest arithmetic mean

score was found to be 2.26 (somewhat agree) and the highest arithmetic mean score was found to be 4.47 (completely agree).

The pre-service teachers evaluated all the questions belonging to the Dimension of Justification of Knowledge with an arithmetic mean score of 4.14 (strongly agree). The lowest arithmetic mean score was 2.43 (slightly agree) and the highest arithmetic mean score was 5.00 (completely agree). The item "Ideas in science can emerge from the questions you ask yourself about the subject and your experimental studies." in the Dimension of Justification of Knowledge received the lowest arithmetic mean score of 3.50 (strongly agree). The item "There can be more than one way to test ideas in scientific studies." in the Dimension of Justification of Knowledge received the highest arithmetic mean score of 4.40 (completely agree).

The pre-service teachers evaluated all the questions belonging to the Source/Invariance of Knowledge Dimension with an arithmetic mean score of 2,09 (slightly agree). The lowest arithmetic mean score was found to be 1,00 (strongly disagree) and the highest arithmetic mean score was found to be 3,86 (strongly agree). The item "Everything the teacher says in class is true." in the Source/Invariance of Knowledge Dimension received the lowest arithmetic mean score of 1.67 (strongly disagree). The item "You can be sure that what you read in scientific books is true." in the Source/Invariance of Knowledge Dimension received the highest arithmetic mean score of 2.73 (somewhat agree).

The pre-service teachers evaluated all the questions belonging to the Development of Knowledge Dimension with an arithmetic mean score of 4.03 (strongly agree). The lowest arithmetic mean score was 2.20 (slightly agree) and the highest arithmetic mean score was 5.00 (completely agree) in the evaluation of the pre-service teachers for all the questions belonging to the Development of Knowledge Dimension. The item "Some scientific ideas today are different from what scientists thought before." in the Development of Knowledge Dimension received the lowest arithmetic mean score of 3.83 (strongly agree). The item "Scientific ideas can sometimes change." in the Development of Knowledge Dimension received the highest arithmetic mean score of 4.23 (completely agree).

### Results Related to the Second Sub-Problem

The second sub-problem was posed as "What is the level of preprofessional teacher identities of pre-service teachers?" and the descriptive statistics of pre-service teachers' preprofessional teacher identity levels are presented in Table 5.

Table 5. Descriptive Statistics of Pre-Service Teachers' Early Teacher Identity Levels

| Dimension / Scale                          | N   | Minimum | Maximum | $\bar{x}$ | <i>sd</i> |
|--|-----|---------|---------|-----------|-----------|
| Self-categorization as a teacher dimension | 227 | 1,40    | 5,00    | 3,58      | ,818      |
| Confidence in becoming a teacher dimension | 227 | 1,33    | 5,00    | 3,81      | ,653      |
| Participation as a teacher dimension       | 227 | 2,17    | 5,00    | 3,84      | ,693      |
| Early Teacher Identity Measure             | 227 | 2,24    | 4,82    | 3,70      | ,579      |

As seen on Table 5, the pre-service teachers evaluated all the questions of the Pre-Professional Teacher Identity Scale with an arithmetic mean score of 4.82 (completely agree). The lowest arithmetic mean score was 2.24 (I somewhat agree) and the highest arithmetic mean score was 4.82 (I completely agree) in the pre-service teachers' evaluation of all the questions of the Pre-Professional Teacher Identity Scale.

The pre-service teachers evaluated all the questions belonging to the Self-Categorization as a Teacher Dimension with an arithmetic mean score of 3.58 (strongly agree). The lowest arithmetic mean score was 1.40 (strongly disagree) and the highest arithmetic mean score was 5.00 (strongly agree). The item "I can easily characterize myself as a teacher" in the Self-Categorization as a Teacher Dimension received the lowest arithmetic mean score of 3.26 (somewhat agree). The

item “I have difficulty thinking of myself as teaching a group of children or adults” in the Self-Categorization as a Teacher Dimension received the highest arithmetic mean score of 4.05 (strongly agree).

The pre-service teachers evaluated all the questions related to the Confidence in Being a Teacher Dimension with an arithmetic mean score of 3.81 (strongly agree). The lowest arithmetic mean score was found to be 1.33 (strongly disagree) and the highest arithmetic mean score was found to be 5.00 (strongly agree). The item “I often have doubts about my competencies to be a good teacher” in the Confidence in Being a Teacher Dimension received the lowest arithmetic mean score of 3.44 (strongly agree). The item “I have no idea what it means to be a good teacher” in the Confidence in Being a Teacher Dimension received the highest arithmetic mean score of 4.32 (completely agree).

The pre-service teachers evaluated all the questions belonging to the Dimension of Taking Part as a Teacher with an arithmetic mean score of 3.84 (strongly agree). The lowest arithmetic mean score was found to be 2.17 (slightly agree) and the highest arithmetic mean score was found to be 5.00 (completely agree). The item “I am often consulted by my family and friends about working with and caring for children or adults” in the Dimension of Being Involved as a teacher received the lowest arithmetic mean score of 3.25 (somewhat agree). The item “Helping a child learn something new is a source of happiness for me.” in the dimension of Taking Part as a teacher received the highest arithmetic mean score of 4.31 (completely agree).

### Findings Related to the Third Sub-Problem

The third sub-problem was formulated as “Is there a significant difference in the epistemological beliefs of pre-service teachers according to their gender and the undergraduate program they are enrolled in?” and Table 6 shows whether there is a significant difference in the epistemological beliefs of pre-service teachers according to their gender, and Table 7 shows whether there is a significant difference in the epistemological beliefs of pre-service teachers according to the undergraduate program they are enrolled in.

Table 6. Mann Whitney U Test Results of Pre-Service Teachers’ Epistemological Beliefs According to their Gender

| Dimension / Scale                         | Gender | N   | Mean Rank | Mean Sum | <i>U</i> | <i>z</i> | <i>p</i> |
|---|--------|-----|-----------|----------|----------|----------|----------|
| Justification of knowledge dimension      | Female | 187 | 114.92    | 21490.00 | 3568.00  | -.459    | .646     |
|   | Male   | 40  | 109.70    | 4388.00  |          |          |          |
| Source / certainty of knowledge dimension | Female | 187 | 111.91    | 20926.50 | 3348.50  | -1.041   | .298     |
|   | Male   | 40  | 123.79    | 4951.50  |          |          |          |
| Development of knowledge dimension        | Female | 187 | 114.06    | 21330.00 | 3728.00  | -.032    | .974     |
|   | Male   | 40  | 113.70    | 4548.00  |          |          |          |
| Epistemological Belief Scale              | Female | 187 | 112.69    | 21073.00 | 3495.00  | -.651    | .515     |
|   | Male   | 40  | 120.13    | 4805.00  |          |          |          |

When Table 6 is examined, according to the results of Mann Whitney U Test applied on the basis of gender variable, the scores of pre-service teachers from the whole epistemological belief scale ( $U=3495,00$ ,  $z=-,651$ ,  $p=,515$ ), the scores from the dimension of realization of knowledge ( $U=3568,00$ ,  $z=-,459$ ,  $p=,646$ ), source/invariance of knowledge dimension ( $U=3348,50$ ,  $z=-1,041$ ,  $p=,298$ ), and development of knowledge dimension ( $U=3728,00$ ,  $z=-,032$ ,  $p=,974$ ) did not show a significant difference.

Table 7. Kruskal Wallis Test Results of Pre-Service Teachers' Epistemological Beliefs According to their Registered Undergraduate Programs

| Dimension / Scale                         | Registered Undergraduate Program      | N   | Mean Rank | $\chi^2$ | df | p    |
|---|---------------------------------------|-----|-----------|----------|----|------|
| Justification of knowledge dimension      | Primary school mathematics teaching   | 36  | 122.10    | 2.090    | 4  | .719 |
|   | Guidance and psychological counseling | 103 | 113.00    |          |    |      |
|   | Primary school teaching               | 53  | 118.46    |          |    |      |
|   | Social studies teaching               | 19  | 104.26    |          |    |      |
|   | Turkish language teaching             | 16  | 99.03     |          |    |      |
| Source / certainty of knowledge dimension | Primary school mathematics teaching   | 36  | 101.71    | 5.752    | 4  | .218 |
|   | Guidance and psychological counseling | 103 | 118.68    |          |    |      |
|   | Primary school teaching               | 53  | 104.25    |          |    |      |
|   | Social studies teaching               | 19  | 139.08    |          |    |      |
|   | Turkish language teaching             | 16  | 114.06    |          |    |      |
| Development of knowledge dimension        | Primary school mathematics teaching   | 36  | 114.72    | 7.788    | 4  | .100 |
|   | Guidance and psychological counseling | 103 | 102.13    |          |    |      |
|   | Primary school teaching               | 53  | 131.77    |          |    |      |
|   | Social studies teaching               | 19  | 119.97    |          |    |      |
|   | Turkish language teaching             | 16  | 122.81    |          |    |      |
| Epistemological Belief Scale              | Primary school mathematics teaching   | 36  | 109.96    | 1.304    | 4  | .861 |
|   | Guidance and psychological counseling | 103 | 111.43    |          |    |      |
|   | Primary school teaching               | 53  | 118.23    |          |    |      |
|   | Social studies teaching               | 19  | 126.92    |          |    |      |
|   | Turkish language teaching             | 16  | 110.28    |          |    |      |

When Table 7 is examined, according to the results of the Kruskal Wallis Test applied on the basis of the undergraduate program enrolled, the scores of the pre-service teachers from the whole epistemological belief scale ( $X^2=1,304$ ,  $df=4$ ,  $p=,861$ ), The scores they received from the dimension of actualization of knowledge ( $X^2=2,090$ ,  $df=4$ ,  $p=,719$ ), the scores they received from the dimension of source/invariance of knowledge ( $X^2=5,752$ ,  $df=4$ ,  $p=,218$ ), the scores they received from the dimension of development of knowledge ( $X^2=7,788$ ,  $df=4$ ,  $p=,100$ ) did not show a significant difference.

### Results Related to the Fourth Sub-Problem

The fourth sub-problem was posed as “Is there a significant difference in preprofessional teacher identities according to the gender and undergraduate program of pre-service teachers?” and Table 8 shows whether there is a significant difference in preprofessional teacher identities according to the gender of pre-service teachers, and Table 9 shows whether there is a significant difference in preprofessional teacher identities according to the undergraduate program of pre-service teachers.

Table 8. Mann Whitney U Test Results of Pre-Service Teachers' Early Teacher Identity According to their Gender

| Dimension / Scale                          | Gender | N   | Mean Rank | Mean Sum | U       | z     | p    |
|--|--------|-----|-----------|----------|---------|-------|------|
| Self-categorization as a teacher dimension | Female | 187 | 114.37    | 21387.00 | 3671.00 | -.184 | .854 |
|  | Male   | 40  | 112.28    | 4491.00  |         |       |      |
| Confidence in becoming a teacher dimension | Female | 187 | 112.21    | 20983.50 | 3405.50 | -.890 | .373 |
|  | Male   | 40  | 122.36    | 4894.50  |         |       |      |
| Participation as a teacher dimension       | Female | 187 | 115.51    | 21599.50 | 3458.50 | -.749 | .454 |
|  | Male   | 40  | 106.96    | 4278.50  |         |       |      |
| Early Teacher Identity Measure             | Female | 187 | 114.89    | 21483.50 | 3574.50 | -.439 | .660 |
|  | Male   | 40  | 109.86    | 4394.50  |         |       |      |

When Table 8 is examined, according to the Mann Whitney U Test results applied on the basis of gender variable, the scores of pre-service teachers from the whole preprofessional teacher identity scale (U=3574,50, z=-,439, p=.660), scores on the self-categorization as a teacher dimension (U=3671,00, z=-,184, p=.854), confidence in being a teacher dimension (U=3405,50, z=-,890, p=.373), and taking part as a teacher dimension (U=3458,50, z=-,439, p=.660) did not show a significant difference.

Table 9. Kruskal Wallis Test Results of Pre-Service Teachers' Epistemological Beliefs According to their Registered Undergraduate Programs

| Dimension / Scale                          | Registered Undergraduate Program      | N   | Mean Rank | X <sup>2</sup> | df | p    |
|--|---------------------------------------|-----|-----------|----------------|----|------|
| Self-categorization as a teacher dimension | Primary school mathematics teaching   | 36  | 127.25    | 17.479         | 4  | .002 |
|  | Guidance and psychological counseling | 103 | 95.17     |                |    |      |
|  | Primary school teaching               | 53  | 1243.44   |                |    |      |
|  | Social studies teaching               | 19  | 146.21    |                |    |      |
|  | Turkish language teaching             | 16  | 135.91    |                |    |      |
| Confidence in becoming a teacher dimension | Primary school mathematics teaching   | 36  | 118.40    | 5.422          | 4  | .247 |
|  | Guidance and psychological counseling | 103 | 103.30    |                |    |      |
|  | Primary school teaching               | 53  | 124.55    |                |    |      |
|  | Social studies teaching               | 19  | 121.18    |                |    |      |
|  | Turkish language teaching             | 16  | 129.53    |                |    |      |
| Participation as a teacher dimension       | Primary school mathematics teaching   | 36  | 128.93    | 10.884         | 4  | .028 |
|  | Guidance and psychological counseling | 103 | 100.18    |                |    |      |
|  | Primary school teaching               | 53  | 115.98    |                |    |      |
|  | Social studies teaching               | 19  | 142.05    |                |    |      |
|  | Turkish language teaching             | 16  | 129.47    |                |    |      |
| Early Teacher Identity Measure             | Primary school mathematics teaching   | 36  | 129.06    | 14.218         | 4  | .007 |
|  | Guidance and psychological counseling | 103 | 96.61     |                |    |      |
|  | Primary school teaching               | 53  | 122.88    |                |    |      |
|  | Social studies teaching               | 19  | 139.42    |                |    |      |
|  | Turkish language teaching             | 16  | 132.50    |                |    |      |

When Table 9 is examined, according to the results of the Kruskal-Wallis Test applied based on the undergraduate program enrolled, the scores of pre-service teachers on the dimension of confidence in becoming a teacher ( $X^2=5,422$ ,  $df=4$ ,  $p=.247$ ) did not show a significant difference. In addition, according to the results of the Kruskal Wallis Test applied on the basis of the undergraduate program enrolled, the scores of the pre-service teachers from the whole preprofessional teacher identity scale ( $X^2=14,218$ ,  $df=4$ ,  $p=.8007$ ), the scores they received from the dimension of self-categorization as a teacher ( $X^2=17,479$ ,  $df=4$ ,  $p=.002$ ), the scores they received from the dimension of taking place as a teacher ( $X^2=10,884$ ,  $df=4$ ,  $p=.028$ ) showed a significant difference. Beyond the standard Kruskal-Wallis test, pairwise comparisons were made with the Dunn-Bonferonni correction to determine which groups were different for the cases where there was a significant difference. However, because of the application of the Dunn-Bonferonni correction, it was determined that there was a significant difference only between the scores obtained from the dimension of self-categorization as a teacher and that this difference occurred at a low effect size (.28) between the students enrolled in the PDR and Social Studies Teaching Program.

### Results Related to the Fifth Sub-Problem

The fifth sub-problem was formulated as "Is there a significant relationship between pre-service teachers' epistemological beliefs and pre-professional teacher identities?" and the significant relationship matches between pre-service teachers' epistemological beliefs and pre-professional teacher identities are presented in Table 10.

Table 10. Spearman's Rank Correlation Analysis Between Epistemological Belief and Early Teacher Identity of Pre-Service Teachers

| Correlated Items  | n   | $r_s$ | p    |
|---|-----|-------|------|
| Justification of knowledge – Self-categorization as a teacher | 227 | .142  | .032 |
| Justification of knowledge – Participation as a teacher       | 227 | .249  | .000 |
| Justification of knowledge – Early Teacher Identity           | 227 | .224  | .001 |
| Source / certainty of knowledge – Participation as a teacher  | 227 | -.139 | .036 |
| Source / certainty of knowledge – Early Teacher Identity      | 227 | -.137 | .039 |
| Development of knowledge – Self-categorization as a teacher   | 227 | .321  | .000 |
| Development of knowledge – Confidence in becoming a teacher   | 227 | .195  | .003 |
| Development of knowledge – Participation as a teacher         | 227 | .306  | .000 |
| Development of knowledge – Early Teacher Identity             | 227 | .354  | .000 |
| Self-categorization as a teacher – Justification of knowledge | 227 | .142  | .032 |
| Self-categorization as a teacher – Epistemological Belief     | 227 | .141  | .034 |
| Participation as a teacher – Epistemological Belief           | 227 | .141  | .034 |
| Epistemological Belief – Early Teacher Identity               | 227 | .162  | .014 |

When Table 10 is examined, it is found that there is a positive, low level ( $r_s=.16$ ,  $p=.01$ ) significant relationship between pre-service teachers' epistemological beliefs and their pre-professional teacher identities.

A negative, low level ( $r_s=-.13$ ,  $p=.03$ ) significant relationship was found between the source/invariance of knowledge dimension and preprofessional teacher identity, and a negative, low level ( $r_s=-.13$ ,  $p=.03$ ) significant relationship was found between the source/invariance of knowledge dimension and being a teacher dimension. The lowest positive correlation was observed at a low level ( $r_s=.14$ ,  $p=.03$ ) between the self-categorization as a teacher dimension and

epistemological beliefs. The highest positive relationship was found between the development of knowledge dimension and preprofessional teacher identity at a medium level ( $r_s=,35, p=,00$ ).

## Result and Discussion

In this section, the results of the study are presented in the light of the findings obtained in the study and a discussion is made in the light of the related literature.

When the responses of the pre-service teachers to the whole epistemological belief scale are examined, it is seen that the scores are at a medium level, while a high score is observed in the dimensions of justification of knowledge and development of knowledge. On the other hand, it was determined that there was a moderate tendency in the sub-dimensions of the source/invariance of knowledge. This finding reveals an understanding that pre-service teachers do not attribute an absolute and unchanging meaning to knowledge, but it also reveals that scientists' perspectives on knowledge differ from other people. The results of the studies conducted by Turgut, Öztürk, and Eş (2017) and Yenice and Atmaca (2017) are like this result.

The responses of the pre-service teachers included in the study to the epistemological belief scale and its sub-dimensions do not show a significant difference in terms of both gender and the program they are enrolled in. While this result is like the results of Demir (2012)'s study, it differs from the results of the study conducted by Deryakulu and Büyüköztürk (2005) to determine the epistemological beliefs of pre-service teachers in terms of both gender and program of enrolment.

On the other hand, it is seen that pre-service teachers' perceptions of their pre-professional teacher identities are quite high. It was concluded that both their categorization of themselves as a teacher, their self-confidence in the profession and their positioning themselves within the teaching profession were at the desired level in terms of their teacher identities. In Yeşilyurt's (2011) and Çekin's (2013) studies, the results of Yeşilyurt's (2011) and Çekin's (2013) findings that pre-service teachers were "quite adequate" in terms of giving importance to national and universal values and "adequate" in terms of ensuring personal development support the results of this study. In addition, the scores of pre-service teachers from the whole preprofessional teacher identity scale, the scores from the dimension of categorizing oneself as a teacher, and the scores from the dimension of taking part as a teacher showed a significant difference based on the variable of the undergraduate program enrolled in. As a result of the pairwise comparisons, it was concluded that there was a significant difference only between the scores obtained from the dimension of self-categorization as a teacher and that this difference occurred at a low effect size between the students enrolled in the PDR and Social Studies Teaching Program. When the studies on pre-service teachers' opinions, attitudes and perceptions towards some variables are examined, there are studies (Ekici, 2014), (Özbek, Kahtaoglu, & Özgen, 2007) (Aydın, Ömür, & Argon, 2015) (Terzi & Tezci, 2007) in which significant differences emerged regarding the department of enrollment.

Finally, it was concluded that there was a low-level positive relationship between pre-service teachers' epistemological beliefs and their pre-professional teacher identities, and there was a negative relationship between some sub-dimensions of the two scales (source/invariance of knowledge dimension and taking part as a teacher dimension and source/invariance of knowledge dimension and pre-professional teacher identity).

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