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International Journal of Psychology and Educational Studies

Examination of the Curriculum Knowledge Levels of Pre-Service Teachers in Terms of Different Variables

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ARTICLE INFO

Article History:
Received 09.02.2020
Received in revised form 25.03.2020
Accepted 11.04.2020
Available online 04.05.2020

ABSTRACT

The teaching profession is an area of expertise that combines many professional and academic competencies. While all of these competencies are important for the quality of learning-teaching processes, the curriculum and content knowledge that teachers are expected to have is one of the main characteristics that are directly determinative in achieving the learning objectives. This study aimed to examine the pre-service teachers' knowledge of curriculum in terms of different variables. The study group of the study, which was conducted according to the descriptive research model, consisted of 237 students in the 4th grade of the faculty in the 2018-2019 academic year. In the study, the pre-service teachers' general curriculum knowledge, the average points they received from curriculum development questions and the average points they received only from the questions related to the curriculum in their field of study were handled. As a result of the findings, it was seen that pre-service teachers' curriculum knowledge in their field showed a significant difference in favor of female teacher candidates. Also, it was observed that the average of all three points of pre-service teachers differed significantly according to their branches and general curriculum knowledge differed significantly according to their branches.

Keywords:
Curriculum, Pre-service Teachers, Teacher Competencies

1. Introduction

The rapid developments in the scientific, technological, economic and social fields in the world bring changes in the field of education as well and as a result, there are some differences in the understanding of teaching and learning (Arslan & Özpınar, 2008). Although many important variables enable these differences to be reflected in educational processes, curricula are the most functional tools that can be used to achieve this goal. Because the curriculum helps to adapt to change in the shortest and practical ways through the planned and guided experiences it contains.

In addition to the aforementioned changes, the curricula have a direct impact on the creation of qualified manpower needed by the communities. In this regard, many countries make important arrangements in the field of education, especially in curriculum development studies and make great efforts to prepare curricula that can help reach social and educational goals. One of the determining factors in achieving the desired outcomes at the end of these studies is the qualifications of the curriculum. Another factor that is as decisive as the qualifications of the curricula is the teachers who are the practitioners of these curricula. The individual and professional competencies that teachers have are important for the effectiveness of the curricula.

Some of the personal features expected of teachers may be listed as; being open-minded and objective towards students, considering the expectations and needs of students, being able to investigate problems related to education by scientific methods, considering individual differences, being open to innovations and

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http://dx.doi.org/10.17220/ijpes.2020.02.020

developments, understanding and interpreting social developments, and developments in educational technologies. (Çelikten, Şanal & Yeni, 2005: 207-237). When considering their professional competencies, teachers are expected to have sufficient knowledge and skills in three main areas: general culture and general talent knowledge, professional knowledge and field knowledge (Demirel, 1999: 192). When pedagogical content knowledge components are examined in general; it is handled in four dimensions as "subject area knowledge", "knowledge of student understanding", "knowledge of teaching strategies" and "curriculum knowledge" (Grossman, 1990; Shulman, 1987). Curriculum knowledge includes how the concepts related to a subject are understood by the student and the process of concept development in the student (Shulman, 1986).

Although all these competencies vary from society to society and from culture to culture; the detailed determination of the competence areas that teachers should have is important for each country (Gökçe, 2003) because there is a difference between a teacher who fulfills the requirements of the teaching profession and teachers who do not have the minimum qualifications and therefore cannot fulfill the requirements of the profession and this situation directly affects the student success (Özer and Gelen, 2008). In line with this perspective, the Ministry of National Education has been determined in several competencies in 3 main areas: professional knowledge, professional skills, attitudes and values to carry out the teaching profession effectively and efficiently. Some items in the field education subtitle, which are among these fields, and the program information expected to be prospective teachers are mentioned. The items in question are:

1. Explain the curriculum of the field with all its elements.
2. Associates the forehead curriculum with other related curricula (MEB, 2017).

As it is seen, it is underlined that teachers need to have sufficient knowledge about not only curricula related to their fields but also curricula related to different courses. As stated by the ministry of education, teachers should have a good command of certain topics, contents, skills, goals and all the elements that make up the content of the program (Posner, 1995). Because teachers have to organize their learning lives according to their curricula. For this reason, the curricula should be understood and applied correctly by the teachers. This situation raises the need for teachers and prospective teachers to be good literate students (Tabak and Çetinkaya, 2019).

Teacher competencies are among the main factors that determine quality and efficiency in education. For this reason, apart from this study carried out by the Ministry of National Education, different studies were carried out to determine the competencies in question. In the study carried out by one of them, the Turkish Education Association (TED), teacher competencies are expressed as follows;

1. The teachers are dedicated to their students and students' learning.

2. Technological pedagogical content knowledge: To be knowledgeable about curriculum and subject area, how the curriculum will be taught and its relation with other fields, the latest developments in the field, the basic concepts, tools and structures of the field, the integration of the content to be taught with technology.

3. Planning and implementing teaching: Planning based on knowledge of teaching area, students, community and curriculum objectives; Sequentially effectively design and apply learning within a set of topics and subjects based on the knowledge of the curriculum. Understanding how students' learning approaches differ and creating adaptable learning opportunities for different students; planning for the development of different age and ability groups; know how to individualize strategies so that individual learning potential can be fully developed.

4. Assessment and monitoring: Understanding and using formal and informal assessment strategies to ensure students' intellectual, social and physical continuous improvement.

5. To be able to provide effective communication and manage student behaviors in the teaching and learning environment: Using information about effective verbal, nonverbal media communication techniques to provide active learning, collaboration and supportive interaction in the classroom. Understanding and using individual and group motivation to create a learning environment that will encourage positive interaction, active participation in learning and self-motivation.

6. Planning and realizing individual and professional development: Continuously questioning their own applications, ensuring their professional development, systematically thinking about their own applications and learning from their experience.

7. Collaboration, teamwork and collaboration with other teachers, parents and school staff: Building relationships with colleagues, parents and other institutions to support students' learning and development.

8. To know and understand the professional duties and legislation related to the job.

9. Acting responsibly and critically within the legal and ethical framework (TED, 2009)

As can be seen from the explanations above, although teacher competencies cannot be expressed with standard criteria yet, it is useful to underline that there are some features that a qualified teacher should have. The curriculum knowledge included in these features is an important competence that can be directly effective to increase the efficiency of teaching processes and accompany students to the desired level. In addition to being knowledgeable and able to teach what they know very well, teachers are also the ones who facilitate learning and teach the ways of learning, implement the curriculum, manage education and evaluate both education and student (Sönmez, 2003). For this reason, curriculum knowledge provides benefits to teachers to carry out appropriate assessment-evaluation processes as well as to plan and implement learning-teaching processes.

It is possible with the pre-service and in-service training programs to gain curriculum knowledge competency to prospective teachers and teachers. However, it can be said that it is important for teachers who are obliged to teach and have some qualifications to fulfill their responsibilities in this regard and to start the profession by gaining these qualifications before the service (Taşgın and Sönmez, 2010). For this reason, the education received by pre-service teachers during their undergraduate education is very important to increase their professional competencies.

The general aim of this research is to evaluate the pre-service teachers' curriculum information in terms of various variables. In line with this goal, answers to the following questions were sought;

1. How do pre-service teachers' curriculum knowledge levels change by gender?

2. How the pre-service teachers' curriculum knowledge levels change according to their status of attending KPSS (Public Personnel Selection Exam) course?

3. How do the pre-service teachers' curriculum knowledge levels change according to the status of taking the curriculum development course content in the KPSS course?

4. How do the pre-service teachers' curriculum knowledge levels change according to their branches?

5. How do the pre-service teachers' curriculum knowledge levels change according to their grade point average?

6. How do the pre-service teachers' curriculum knowledge levels change according to the type of high school they graduated from?

7. How do the pre-service teachers' curriculum knowledge levels change according to the order of university preference of the department they study?

Considering that pre-service teachers will be the practitioners of the curriculum related to their branches soon, the results to be obtained in the research are expected to provide important feedback on the success of both curriculum development mechanisms and educational processes. It is also predicted that results will contribute to the evaluation of pre-service training processes of teacher candidates. In the literature, there are many studies to determine the professional competencies of teacher candidates. However, there is a limited study conducted by Çetinkaya and Tabak (2019), Süral and Dedebali, (2018), Erdem ve Eğmir (2018), Dönmez and Baştürk (2010) with pre-service teachers, and to determine the curriculum information of pre-service teachers. For this reason, it is thought that the results of this study, which was carried out with prospective teachers in different fields, will also contribute to the elimination of the deficiency in the literature.

2. Methodology

2.1. Research Design

In this study, which aims to determine which variables related to the curriculum knowledge levels of pre-service teachers studying in the last year, descriptive screening model was used. In the screening researches, researchers are generally concerned with how individuals and samplers are distributed rather than why opinions and features originate (Fraenkel & Wallen, 2006).

2.2. Study Group

The study group of this research consists of students studying in the 4th grade in the education faculty of a public university in Ankara in the spring term of the 2018-2019 academic year. Volunteering was based on participation in the study. After removing 6 incorrectly and incomplete forms from the data collection tools that were answered and returned, the remaining 257 forms were evaluated. Firstly, one-way extreme value analysis based on z scores was performed and 9 people were excluded from the evaluation. After the versatile extreme value analysis made according to the Mahalanobis distances, 11 people were removed from the dataset and the necessary analyzes were made on the remaining 237 people.

When the demographic characteristics of the pre-service teachers who constitute the study group of the study are examined, the first five preferences of the participants are the women (f = 197) and they attend the KPSS course (f = 146), the vast majority of them attend the university. (f = 105), they do not see the curriculum development course content in the KPSS course (f = 213) and the GPA is between 2.5-3.00 (f = 126).

2.3. Data Collection Tools

Two data collection tools were used to collect data within the scope of this research. These are "Personal Information Form" and "Curriculum Information Achievement Test".

Personal Information Form: In the study, “Personal Information Form” was applied to the participants, first of all, the status of going to the KPSS course, the status of seeing the content of the curriculum development course in the KPSS course, the section they read, the order they prefer the section they read, the general grade point average. This form was prepared by the researchers.

Curriculum Knowledge Achievement Test: The test, which was developed by researchers to measure the curriculum knowledge of pre-service teachers, consists of two parts and each part contains 20 questions. In the first part, general questions about the content of curriculum development are included and in the second part, questions about the curriculum of the teacher candidates' branches are included. While preparing the questions, the relevant literature and curriculums of various courses were used. While developing the success test in question, the following steps were followed:

1. In the test development process, firstly, the objectives, topics and the weight of the topics in the curriculum of the curriculum development were determined. A five-choice multiple-choice test item was written for both parts to measure each gain. In this direction, attention was paid to overlapping objectives and questions and a table of symptoms was prepared.

2. To ensure the content validity of the prepared test, the opinions of 2 curriculum developers in terms of compliance with the assessment-evaluation principles, 2 curriculum development specialists and grammar in the examination of the suitability in terms of content (symptom table and degree of achievements) and 1 Turkish Language specialist were asked for clarity. In line with the opinions of the experts, necessary corrections were made in the item roots and options.

3. After the corrections, to learn about the understandability of questions, application time, etc. application period, etc. a preliminary trial one-on-one application was carried with a group of 10 people.

4. After the information obtained from the pre-application and the necessary corrections, the pilot application was started. To determine the validity and reliability of the 53 items in the trial form, an application was made to a different group (210 people) than the group where the final application will be performed.

5. As a result of pilot implementation, item and test statistics were calculated using TAP and SPPS 23 package programs. For item analysis, the discrimination and difficulty indices of each item were calculated and 13 items that did not meet the criteria were removed from the test.

6. As a result, the item difficulty indexes ranged from 0.40 to 0.56, and the item discrimination force indexes ranged from 0.32 to 0.61. When the test statistics were examined, it was determined that the average difficulty of the test was 0.48 and the KR-20 reliability coefficient was 0.83. These results show that the developed 40-item success test is valid and reliable.

7. After the validity and reliability analyzes were completed, a 40-item achievement test consisting of 20 items related to the content of the curriculum development course and 20 items related to the curriculum of the branches was created.

8. Finally, the achievement test was applied to pre-service teachers studying in the final year and the knowledge levels of the candidates regarding the curriculum were tried to be revealed. While the lowest score that can be obtained from the scale is 0, the highest score is 40. While the actual application is being made, with a guideline per test, the purpose of this test, how long it will take, etc. information was written.

2.4. Data Analysis

To decide which statistical techniques to use in the analysis of the data, whether the data were normally distributed and the homogeneity of the variances was statistically tested. First of all, whether the data obtained from the groups show normal distribution or not was analyzed by descriptive methods, graphical methods and hypothesis testing. For descriptive methods, the skewness and kurtosis indices obtained by dividing the skewness, kurtosis coefficients and skewness and kurtosis coefficients by their standard error were examined. For graphical methods, it is examined whether the distribution is normal by looking at "box plot, histogram and line chart". "Kolmogorov-Smirnov test" was used for hypothesis testing. As a result of the Kolmogorov-Smirnov test using the methods mentioned above, it can be said that the distribution of the data is normal since the p values are greater than .05, the skewness-kurtosis coefficients and indices are in the desired range, and the graphs show notation for normality. Also, the homogeneity of the variances was examined with the "Levene's Test of Equality of Error Variances" and it was observed that the variances were homogeneous. As a result, parametric statistics were used since it was seen that the data met the parametric test conditions after the analyses. In this context, on the knowledge levels of prospective teachers participating in the research regarding the curriculum; With the t-test for independent samples, whether gender, going to KPSS course, seeing the content of the course development course in KPSS course affects; Whether the department they studied, the type of high school graduated, and whether the grade point average has an effect was examined with one-way analysis of variance (ANOVA). However, in the research, effect sizes () were calculated to determine the strength of the relationship between variables and values at the levels of 0.01, 0.06 and 0.14 were interpreted as small, medium and large effect sizes in the same order (Cohen, 1988).

In the research, the department's grade point average, graduated high school type and the high number of groups in its variables cause the error to increase. For this reason, Bonferroni correction was made to check the Type I error in comparing these variables. Bonferroni correction is determined by the formula of the significance level/number of groups (Vialatte & Cichocki, 2008). In this study, since the number of groups for teacher candidates was three, the level of significance was determined as .05/3 = .016 with the Bonferroni correction, while the number of groups for the graduated high school type and grade point average was four, this number was .05/4 = 0.012. In the comparisons made according to gender, going to KPSS course and taking curriculum development course in KPSS course, Bonferroni correction was not used since the number of groups was only two and the significance level was taken as .05 for these variables. The analysis of the data was done in SPSS 23.0 package program.

3. Findings

In this section, an answer was sought for the question of which variables related to the curriculum knowledge levels of pre-service teachers studying in the last year of the education faculty.

Findings of whether pre-service teacher candidates' curriculum knowledge level differs by gender

T-test for independent groups was used to determine whether the pre-service teachers' curriculum knowledge levels (in terms of curriculum development knowledge, curriculum knowledge of the field and total test score) differ according to gender and the results have been given in Table 1.

Table 1. The t-test for independent groups results of the pre-service teachers' curriculum knowledge by gender

Type of Knowledge	Gender	N	$\overline{X}$	ss	t	p	η2
Curriculum development knowledge	Woman	197	10.32	3.40	1.06	.29	
	Man	40	9.55	4.34			
Curriculum knowledge of the field	Woman	197	8.47	2.94	2.16	.03*	.09
	Man	40	7.13	3.72			
General curriculum knowledge (Total test score)	Woman	197	18.80	5.21	1.73	.09	
	Man	40	16.68	7.41			

When Table 1 is examined, it can be seen that the pre-service teachers' general curriculum knowledge and curriculum development knowledge did not differ significantly according to gender (t (47) = 1.73, t (47) = 1.06; p> 0.05) and curriculum knowledge related to their own fields showed a significant difference by gender (t (47) = 1.73, t (47) = 1.06; p> .05)). Female pre-service teachers' curriculum knowledge of fields (= 8.47) was higher than male candidates (= 7.13). As a result of the analyses, when the effect sizes for the t-test were examined, the degree of the effect (η) was found to be. 09. Accordingly, the effect was moderate and only 9% of the difference between the knowledge levels of women and men can be explained by gender.

Findings of whether pre-service teacher candidates' curriculum knowledge level differs according to their status of attending KPSS course

The results of the t-test for the independent groups, which were conducted to reveal whether the pre-service teachers' curriculum knowledge levels differ according to the situation they attend the KPSS course, have been given in Table 2.

Tablo 2. The t-test for independent groups results of the pre-service teachers' curriculum knowledge according to their status of attending KPSS course

Type of Knowledge	Status of attending KPSS course	N	$\overline{X}$	ss	t	p
Curriculum development knowledge	Yes	146	10.21	3.47	.31	.76
	No	91	10.07	3.70		
Curriculum knowledge of the field	Yes	146	8.18	2.87	.37	.71
	No	91	8.34	3.48		
General curriculum knowledge (Total test score)	Yes	146	18.40	5.46	.01	.99
	No	91	18.41	5.97		

As it can be seen in Table 2, pre-service teachers' curriculum development knowledge, curriculum knowledge of the field and general curriculum knowledge did not differ their status of attending KPSS course (t (235) =. 31, t (235) =. 37 t (235) =. 01; p> 0.05).

Findings of whether pre-service teacher candidates' curriculum knowledge level differs according to the status of taking the curriculum development course content in the KPSS course

The results of the t-test for the independent groups, which were conducted to reveal whether the knowledge levels of the pre-service teachers about the curriculum differ according to the status of taking the curriculum development course content in the KPSS course, have been given in Table 3.

Table 3. The t-test for independent groups results of the pre-service teachers' curriculum knowledge according to the status of taking the curriculum development course content in the KPSS course

Type of Knowledge	Status of taking the curriculum development course content	N	$\overline{X}$	ss	t	p
Curriculum development knowledge	Yes	24	9.47	2.75	1.01	.31
	No	213	10.30	3.63		
Curriculum knowledge of the field	Yes	24	8.33	2.61	.09	.93
	No	213	8.27	3.15		
General curriculum knowledge (Total test score)	Yes	24	17.81	5.01	.59	.55
	No	213	18.57	5.70		

According to Table 3, it was seen that the pre-service teachers' pre-service teachers' curriculum development knowledge, curriculum knowledge of the field and general curriculum knowledge did not differ according to the status of taking the curriculum development course content in the KPSS course ($t(232) = 1.01$, $t(232) = .09$, $t(232) = .59$, $p > 0.05$).

Findings of whether pre-service teacher candidates' curriculum knowledge level differs according to their branches

Descriptive analysis and one-way analysis of variance (ANOVA) results have been presented in Table 4 and Table 5 to reveal whether the level of knowledge of teacher candidates regarding curriculum differs according to their branches.

Table 4. The results of the descriptive analysis in which pre-service teachers' curriculum knowledge were compared according to their branches

Type of Knowledge	Branches	N	$\overline{X}$	Ss
Curriculum development knowledge	Pre-school teaching	121	10.65	2.96
	Classroom teaching	75	10.99	3.94
	Science teaching	41	7.34	3.21
	Total	237	10.19	3.57
Curriculum knowledge of the field	Pre-school teaching	121	8.82	2.58
	Classroom teaching	75	9.01	3.25
	Science teaching	41	5.17	2.41
	Total	237	8.25	3.11
General curriculum knowledge (Total test score)	Pre-school teaching	121	19.47	4.41
	Classroom teaching	75	20.00	5.94
	Science teaching	41	12.51	4.73
	Total	237	18.44	5.67

Table 5. The results of one-way analysis of variance (ANOVA) where pre-service teachers' curriculum knowledge were compared according to their branches

Type of Knowledge	Source	Sum of squares	Df	F	p
Curriculum development knowledge	Between groups	405.82	2	18.20	.00*
	In-groups	2620.05	235		
	Total	3025.87	237		
Curriculum knowledge of the field	Between groups	472.05	2	30.43	.00*
	In-groups	1822.82	235		
	Total	2294.87	237		
General curriculum knowledge (Total test score)	Between groups	1751.94	2	35.14	.00*
	In-groups	5858.61	235		
	Total	7610.56	237		

*p < .05

When Table 5 is examined, it can be seen that the pre-service teachers' curriculum development knowledge, curriculum knowledge of the field and general curriculum knowledge regarding the field differ significantly according to their branches (F (2-237) = 18.20, F (2-237) = 30.43, F (2-237) = 35.14,; (p <.05).

A multiple comparison (post-hoc) test was carried out to reveal the difference between which groups this difference was due to. Since the variances are homogeneously distributed but the sample numbers in the groups were not equal, the results of the Scheffe test, one of the post-hoc tests were taken into consideration and the results were given in Table 6.

Table 6. The results of the Scheffe test in which pre-service teachers' curriculum knowledge levels were compared according to their branches

Type of Knowledge	Branche (i)	Branche (j)	Mean difference (i-j)	Standard error	p
Curriculum development knowledge	Pre-school teaching	Classroom teaching	-.34	.49	.79
		Science teaching	3.31	.60	**.00***
	Classroom teaching	Pre-school teaching	.34	.49	.79
		Science teaching	3.65	.65	**.00***
	Science teaching	Pre-school teaching	-3.31	.60	**.00***
		Classroom teaching	-3.65	.65	**.00***
Curriculum knowledge of the field	Pre-school teaching	Classroom teaching	-.19	.41	.89
		Science teaching	3.65	.50	**.00***
	Classroom teaching	Pre-school teaching	.19	.41	.89
		Science teaching	3.84	.54	**.00***
	Science teaching	Pre-school teaching	-3.65	.50	**.00***
		Classroom teaching	-3.84	.54	**.00***
General curriculum knowledge (Total test score)	Pre-school teaching	Classroom teaching	-.53	.73	.77
		Science teaching	6.96	.90	**.00***
	Classroom teaching	Pre-school teaching	.53	.73	.77
		Science teaching	7.49	.97	**.00***
	Science teaching	Pre-school teaching	-6.96	.90	**.00***
		Classroom teaching	-7.49	.97	**.00***

*p <.016

As can be understood from Table 6, it was determined that the differentiation of pre-service teachers according to the branches of their general curriculum was due to the pre-service teachers studying in the science education branch. The difference between the general curriculum knowledge of pre-service teachers studying in science education and the general curriculum knowledge of pre-service teachers of the classroom and pre-school teaching turned out to be significant (p <.016). It was observed that the general

curriculum knowledge of pre-service teachers studying in science education was lower than in other branches (Table 4). It was determined that the differentiation of pre-service teachers' curriculum knowledge of field levels was again due to the pre-service teachers studying in science education. The difference between the curriculum development knowledge levels of pre-service science teachers and pre-school and classroom pre-service was found to be significant (p <.016). It was observed that the pre-service science teachers' curriculum development knowledge level was lower than that of the other branches (Table 4).

Finally, it was determined that the differentiation of pre-service teachers' curriculum knowledge level of the field was again due to the pre-service teachers studied in science education. The difference between the curriculum knowledge of field levels of science pre-service teachers the pre-school and classroom pre-service teachers was found to be significant (p <.016). It was observed that the pre-service teachers' curriculum knowledge level of the field were lower than those in other branches (Table 4). Also, when the averages of the pre-service teachers according to their knowledge types were examined, it was determined that the curriculum development knowledge of the pre-service teachers in all three branches was better than the curriculum knowledge of the field (Table 4).

Findings of whether pre-service teacher candidates' curriculum knowledge level differs according to their GPA

The results of descriptive analysis and one-way analysis of variance that was carried out to reveal whether pre-service teacher candidates' curriculum knowledge level differ according to their GPA were presented in Table 7 and Table 8.

Table 7. The results of the descriptive analysis in which pre-service teachers' curriculum knowledge were compared according to their GPA

Type of Knowledge	GPA	N	$\overline{X}$	Ss
Curriculum development knowledge	between 2-2.5	14	8.50	3.53
	between 2.5-3	126	9.81	3.69
	between 3-3.5	85	10.97	3.25
	between 3.5-4	12	10.58	3.73
	Total	237	10.19	3.57
Curriculum knowledge of the field	between 2-2.5	14	6.71	3.58
	between 2.5-3	126	7.72	3.18
	between 3-3.5	85	9.15	2.74
	between 3.5-4	12	9.25	2.67
	Total	237	8.25	3.11
General curriculum knowledge (Total test score)	2-2.5 arası	14	15.21	6.42
	2.5-3 arası	126	17.54	5.98
	3-3.5 arası	85	20.12	4.55
	3.5-4 arası	12	19.83	5.36
	Total	237	18.44	5.67

Table 8. The results of one-way analysis of variance in which pre-service teachers' curriculum knowledge were compared according to their GPA

Type of Knowledge	Source	Sum of Squares	df	F	p	Eta-squared
Curriculum development knowledge	Between groups	111.09	3	2.97	.032*	.04
	In-groups	2914.78	234			
	Total	3025.87	237			
Curriculum knowledge of the field	Between groups	149.40	3	5.43	.00*	.06
	In-groups	2145.47	234			
	Total	2294.87	237			
General curriculum knowledge (Total test score)	Between groups	512.12	3	5.63	.00*	.07
	In-groups	7098.44	234			
	Total	7610.56	237			

*p < .05

When Table 8 was analyzed, it was seen that the pre-service teachers' general curriculum knowledge, curriculum development knowledge and curriculum knowledge of field showed a significant difference according to their GPA (F (2-237) = 35.14, F (2-237) = 18.20, F (2- 237) = 30.43; p <.05). When the effect size values were analyzed, it can be said that 7% of the variance in the general curriculum, 4% in the curriculum development knowledge and 6% curriculum knowledge of field were explained with GPA and it can be said that the effect was approximately medium in all types of knowledge. Also, multiple comparison (post-hoc) tests were conducted to determine which groups the resulting difference was between. Since the variances were distributed homogeneously but the sample numbers in the groups were not equal, the results of the Scheffe test, one of the post-hoc tests, were taken into consideration and the results were given in Table 9.

Table 9. The results of the scheffe test in which pre-service teachers' curriculum knowledge levels were compared according to their GPA

Type of knowledge	GPA (i)	GPA (j)	Mean Difference (i-j)	Standard error	P
Curriculum development knowledge	Between 2-2.5	Between 2-2.5	-1.31	.99	.629
		Between 2.5-3	-2.47	1.02	.122
		Between 3.5-4	-2.08	1.39	.523
	Between 2.5-3	Between 2-2.5	1.31	.99	.629
		Between 2.5-3	-1.15	.50	.145
		Between 3.5-4	-.77	1.07	.913
	Between 3-3.5	Between 2-2.5	2.47	1.02	.122
		Between 2.5-3	1.15	.50	.145
		Between 3.5-4	.38	1.09	.989
	Between 3.5-4	Between 2-2.5	2.08	1.39	.523
		Between 2.5-3	.77	1.07	.913
		Between 3.5-4	-.38	1.09	.989
Curriculum knowledge of the field	Between 2-2.5	Between 2-2.5	-1.01	.85	.705
		Between 2.5-3	-2.44	.87	.053
		Between 3.5-4	-2.54	1.19	.213
	Between 2.5-3	Between 2-2.5	1.01	.85	.705
		Between 2.5-3	-1.43	.42	**.011***
		Between 3.5-4	-1.53	.92	.428
	Between 3-3.5	Between 2-2.5	2.44	.87	.053
		Between 2.5-3	1.43	.42	**.011***
		Between 3.5-4	-.10	.93	1.000
	Between 3.5-4	Between 2-2.5	2.54	1.19	.213
		Between 2.5-3	1.53	.92	.428
		Between 3.5-4	.10	.93	1.000
General curriculum knowledge	Between 2-2.5	Between 2-2.5	-2.32	1.55	.525
		Between 2.5-3	-4.90	1.59	.025
		Between 3.5-4	-4.62	2.17	.211

(Total test score)		Between 2-2.5	2.32	1.55	.525
	Between 2.5-3	Between 2.5-3	-2.58	.77	.012
		Between 3.5-4	-2.30	1.66	.529
		Between 2-2.5	4.90	1.59	.025
	Between 3-3.5	Between 2.5-3	2.58	.77	.012
		Between 3.5-4	.28	1.70	.999

*p < .012

As can be understood from Table 9, it was determined that the difference of the curriculum knowledge levels of the pre-service teachers according to the grade averages was caused by the difference between the pre-service teachers with a grade point average of 2.5-3 and the pre-service teachers with a grade point average of 3-3.5. The difference between the curriculum knowledge levels of pre-service teachers who have a grade point average of 2.5-3 and the knowledge level of their teachers about their areas between 3-3.5 is significant (p <.05). It was observed that the pre-service teachers' knowledge level of their areas with a grade point average of 2.5-3 was higher than the pre-service teachers with a grade point average of 3-3.5. However, no significant difference was found in the bilateral comparisons made according to the overall grade point average of the pre-service teachers' curriculum knowledge and curriculum development knowledge.

Findings of whether pre-service teacher candidates' curriculum knowledge level differ according to the type of high school they graduated from

Descriptive analysis and one-way analysis of variance analysis were carried out to reveal whether the pre-service teachers' knowledge levels regarding the curriculum differ according to the type of high school they graduated from. The results of this analysis were presented in Table 10 and Table 11.

Table 10. The results of the descriptive analysis in which pre-service teachers' curriculum knowledge were compared according to the type of high school they graduated from

Type of knowledge	High school type	N	$\overline{X}$	Ss
Curriculum development knowledge	Anatolian H.S	72	10.94	3.56
	Teacher H.S	12	11.67	4.44
	Vocational H.S	78	9.83	3.36
	Other	75	9.59	3.54
	Total	237	10.19	3.57
Curriculum knowledge of the field	Anatolian H.S	72	8.36	3.13
	Teacher H.S	12	8.92	3.23
	Vocational H.S	78	8.50	3.33
	Other	75	7.79	2.83
	Total	237	8.25	3.11
General curriculum knowledge (Total test score)	Anatolian H.S	72	19.31	5.61
	Teacher H.S	12	20.58	6.72
	Vocational H.S	78	18.33	5.61
	Other	75	17.39	5.49
	Total	237	18.44	5.67

Table 11. The results of one-way analysis of variance in which pre-service teachers' curriculum knowledge were compared according to the type of high school they graduated from

Type of knowledge	Source	Sum of squares	sd	F	p
Curriculum development knowledge	Between groups	104.23	3	2.78	.04*
	In-groups	2921.63	234		
	Total	3025.87	237		

Curriculum knowledge of the field	Between groups	27.22	3	.94	.42
	In-groups	2267.66	234		
	Total	2294.87	237		
General curriculum knowledge (Total test score)	Between groups	195.09	3	2.05	.11
	In-groups	7415.46	234		
	Total	7610.56	237		

*p < .05

As it can be seen in Table 11, the pre-service teachers' general curriculum knowledge and the curriculum knowledge of field did not differ significantly from the high school type they graduated from ((F (3-237) = 2.05, F (3-237)= 0.94; p> .05), it was seen that the curriculum development knowledge showed a significant difference according to the type of high school they graduated ((F (3-237) = 2.78; p <.05). However, since the level of significance was quite low, no difference was detected.

Findings of whether pre-service teacher candidates' curriculum knowledge level differs according to the order of university preference of the department where they study

The results of descriptive analysis and one-way analysis of variance made to reveal whether pre-service teacher candidates' curriculum knowledge level differ according to the order of university preference of the department where they study were presented in Table 12 and Table 13.

Table 12. The results of the descriptive analysis in which pre-service teachers' curriculum knowledge were compared according to the order of university preference of the department where they study.

Type of knowledge	Order of preference	N	$\overline{X}$	sd
Curriculum development knowledge	Between 1-5	105	0.05	3.42
	Between 6-10	83	10.14	3.60
	Between 11-15	18	11.33	3.65
	Between 16-20	16	9.69	2.50
	21 and above	15	10.53	5.19
	Total	237	10.19	3.57
Curriculum knowledge of the field	Between 1-5	105	8.21	2.75
	Between 6-10	84	7.89	3.30
	Between 11-15	18	9.39	2.68
	Between 16-20	16	8.38	3.03
	21 and above	15	9.07	4.64
	Total	233	8.25	3.11
General curriculum knowledge (Total test score)	Between 1-5	105	18.26	5.02
	Between 6-10	83	18.04	6.21
	Between 11-15	18	20.72	5.83
	Between 16-20	16	18.06	4.51
	21 and above	15	19.60	7.45
	Total	237	18.44	5.67

Table 13. The results of one-way analysis of variance in which pre-service teachers' curriculum knowledge were compared according to the order of university preference of the department where they study.

Type of knowledge	Source	Sum of squares	sd	F	p
Curriculum development knowledge	Between groups	31.65	4	.62	.652
	In-groups	2994.22	233		
	Total	3025.87	237		
Curriculum knowledge of the field	Between groups	44.49	4	1.15	.333
	In-groups	2250.39	233		

	Total	2294.87	237		
General curriculum knowledge (Total test score)	Between groups	133.46	4		
	In-groups	7477.10	233	1.04	.387
	Total	7610.56	237		

As a result of one-way analysis of variance; it was determined that the pre-service teachers' curriculum development knowledge, curriculum knowledge of the field and general curriculum knowledge did not change significantly in the order they preferred the section they studied (F (4-237) =. 62, F (4-237) =. 1.15, (F (4-237) = 1.04;p> .05).

4. Discussion, Conclusion and Suggestions

Teaching is a profession that consists of competencies in three fields: general culture, field knowledge and teaching knowledge. Although the teaching knowledge included in these competencies has many sub-component; the curriculum, which is one of those components and content knowledge is one of the characteristics that a teacher should have to be a good instructive. For this reason, teacher candidates need to be trained in such a way that they can have this competence from the beginning of the teacher training process, not only for teachers but also for improving the quality of teaching processes.

With this study, it has been tried to determine the curriculum knowledge levels of pre-service teachers and to investigate whether the curriculum knowledge levels of them differ according to various variables. For this purpose, the knowledge levels of pre-service teachers were determined by using the average scores they obtained from the achievement test used in the study (general curriculum knowledge), their average scores obtained only from curriculum development questions and the average scores they received only from the questions related to the curriculum of the field they studied; and the relationship between these averages and each variable was handled separately. Accordingly, it was first examined whether the knowledge levels of teacher candidates differ according to the gender variable and as a result of the obtained findings, it was concluded that the curriculum knowledge of the field of pre-service teachers significantly differed in favor of female pre-service teachers.

In the study the relationship between pre-service teachers' curriculum knowledge level and their status of attending Kpss course; and if they are attending the relationship with the status of taking the curriculum development course in these courses was also examined. No significant difference was found in the analysis results for both variables. According to this result, it can be said that the relevant courses taken by pre-service teachers in the education faculty were determinant on the curriculum knowledge and other supplements for supplementary purposes did not have a noticeable effect. This situation reminds us once more of the importance of pre-service teachers' education.

Teacher education, which is a comprehensive and multidimensional process, covers all issues such as the selection of pre-service teachers, pre-service education, implementation period, monitoring-evaluation studies and in-service education (Çelikten, Şanal and Yeni, 2005). Education faculties are the institutions that are involved in these issues and are responsible for the organization of pre-service education processes. The main element that should be taken into consideration in the regulation of these processes is undoubtedly the competencies and features determined for the teaching profession. For this reason, most of the courses offered in education faculties, especially pedagogy courses, should be qualified to increase the professional competencies and qualifications of prospective teachers. Considering that the primary responsibilities of pre-service teachers in their future professional lives are “teaching” and expected to realize these responsibilities within the “curricula” offered to them, it is thought that organizing these lessons in a way that will enable them to define the curriculum as much as possible will contribute to them to fulfill this responsibility in the best way possible.

Since the participant teacher candidates in the study were from different branches, it was also aimed to determine whether the curriculum knowledge levels differ according to their branches. Accordingly, it was determined that the average of all three points of teacher candidates differed significantly according to their branches. According to the findings, it was concluded that the current difference resulted from pre-service teachers studying at science teaching and that science teacher candidates had a relatively low level of

curriculum knowledge for all three types of points. The results of similar studies support these findings. In their studies, Çetinkaya and Tabak (2019) concluded that the pre-service classroom teachers' curriculum knowledge levels were higher than that of mathematics and pre-school teachers. Süral and Dedebali, in their studies (2018), concluded that the curriculum levels of social studies teacher candidates were higher than pre-school teacher candidates. Erdem and Eğmir (2018), on the other hand, obtained the conclusion that Turkish teacher candidates' education curriculum knowledge levels were higher than that of mathematics teacher candidates. As can be seen, the level of curriculum knowledge of teacher candidates in different studies in the literature varies according to the field they are studying. It is thought that this difference may have resulted from the lecturers who are responsible for the courses they have taken during their undergraduate education. Pre-service teachers studying in different departments or even in different branches in the same department can take many common courses from different instructors. This situation may result in the diversity of the lessons being taught by reflecting on the teaching process of many professional and personal characteristics that depend on the instructors. Considering that there are some common competencies and features that are expected to be acquired for all teacher candidates during their pre-service education; it is envisaged that the content of the courses offered in the education faculties will be facilitated to train qualified teachers who do not have any professional deficiencies, including the curriculum knowledge, by all responsible lecturers in line with these competencies and features.

In the study, it was also determined that the level of curriculum development knowledge were commonly higher than the curriculum knowledge of their fields. All of the pre-service teachers did not take the curriculum development course during their pre-service education but they took other pedagogy courses. Considering this with the results of the study it is thought that they had seen the basic concepts related to curriculum development in the relevant pedagogy courses, especially teaching principles and methods; but the contents of these courses and the applications made to recognize the curriculum of their fields in the courses were inadequate. It is thought that in the courses given in the education faculties, benefiting more from the curricula of teacher candidates' branches and increasing the number of applications related to the curricula will be beneficial in eliminating the said inadequacy.

When the relationship between pre-service teachers' grade point averages and curriculum knowledge levels; it was observed that the general curriculum knowledge and the branches that they studied were significantly different. According to this, the general curriculum knowledge of pre-service teachers with a grade point average of 3-3.5 was higher than the pre-service teachers with a grade point average between 2-2.5 and 2.5-3. It was also observed that the curriculum knowledge of fields of the pre-service teachers' whose grade point average were between 2.5-3 was the higher than the pre-service teachers whose grades were between 3-3.5. Although it is expected that pre-service teachers' general curriculum knowledge increased compared to the average of their grades, it is thought that the curriculum knowledge of their fields changed in favor of the students with a low grade point average was since they had taken the course from different lecturers as in the previous variables or since the grades of the courses other than pedagogy courses were included in the averages. On the other hand, when the relationship between pre-service teachers' high school type and curriculum knowledge was examined; it was observed that only the curriculum development knowledge differed significantly according to the type of high school they graduated but this level of significance remained at a very low level. Finally, it was determined that there was no significant difference between the pre-service teachers' preferences of the department in which they are trained and the curriculum knowledge levels.

When the results obtained in the study are evaluated as holistic, it can be said that the variables that are determinant on the curriculum knowledge of pre-service teachers are gender, branch and grade point average. Apart from these variables, which are related to the knowledge levels of prospective teachers, another finding that is thought to be important is the values related to the averages taken by the participants from the entire achievement test (general curriculum knowledge). Considering that the test averages of teacher candidates in different branches are at most half of the total score that can be obtained from the test; it would be correct to say that the curriculum knowledge levels are insufficient (Table 4). Similarly; Dönmez and Baştürk (2010) showed that prospective mathematics teachers have superficial knowledge about mathematics curriculum. Accordingly, it is thought that there is a need to include the curriculum development course, which is offered only in the social studies teaching program in the education faculties,

in the common pedagogy courses for all programs. Due to the stated reasons, it is thought that taking precautions to increase the curriculum knowledge in the courses to be taken by pre-service teachers, especially this course, will benefit from the deficiencies identified in the study.

On the other hand, it is thought that the low level of pre-service teachers' curriculum knowledge level may be since they did not take into account the curriculum adequately during their pre-service education. Baştürk and Dönmez (2010) attributed the pre-service teachers' failure to take into account the curriculum adequately and the fact that institutional responsibility had not yet occurred. On the other hand, Robert, Lattuati and Penninckx (1999) stated that one of the most important factors affecting the formation of corporate responsibility awareness in teachers was the institution-based sanctions studied. Therefore, as emphasized by Baştürk and Dönmez (2011), although the curriculum was explained within the scope of related courses in education faculties; pre-service teachers might not take enough attention to the program because they are far from the administrators and inspectors who question their lectures. In this context, it was thought that increasing the internship practices of teacher candidates during their pre-service education and following these practices seriously by both the internship coordinators of the faculties and the school administrators where they do internship may provide the prospective teachers to consider the curriculum more.

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