

Relationship between Professionalism Levels and Pedagogical Digital Competences of Pre-Service Elementary School Teachers¹

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Abstract

The main objective of this study is to define the relationship between preservice elementary school teachers' professionalism levels and competences of using/creating digital pedagogical tools. In line with this objective, the research was carried out using descriptive and relational survey model from quantitative research methods. Sample of the research is formed of 3rd and 4th grade preservice teachers studying classroom teaching in the 2019-2020 educational year. Descriptive and relational survey model was used, and instant measurement with sectioning method was preferred during the research. "Preservice Teachers' Professionalism Scale" consisting of four sub-dimensions, and "Preservice Teachers' Pedagogical Digital Competence Scale" consisting of three sub-dimensions were used as data collection tool. For the data collected within this period, SPSS 20 package software, Simple Linear Regression Analysis and Pearson Product-Moment Correlation Analysis were used. With the collected data at the end of the process, preservice elementary school teachers' professionalism levels and competences of using/creating digital pedagogical tools were also analyzed in terms of variables such as gender, class level, age, time of computer and internet use. As a result, it was concluded that preservice elementary school teachers' pedagogical digital competences are meaningful predictors of their professionalism levels.

Keywords: Teacher, Pedagogy, Pedagogical Digital Competence, Professionalism, Using a Computer, Using the Internet.

Introduction

Even though pedagogical approaches change from past to present, the effects and responsibilities of teachers on educational activities were never ignored. Teaching is a profession requiring expertness and a need to be in a constant development. Teachers' knowledge, teaching method, attitude towards the students and contribution to the institution where they work have a significant effect on educational activities. The teacher reviewing and following their knowledge on their job according to the developments of the time are said to improve their competences and professionalism by many researchers (Bilgin, Tatar, & Ay, 2012; Harris & Hofer, 2011).

In the 2023 vision announced by the Ministry of National Education of Turkey, it is expressed that teachers who will contribute to educate happy students must have modern professional knowledge and competences (MEB, 2018). Digital age creates new roles for teachers who are the executors of education in classrooms and their knowledge, skills and competences are gaining importance in this period (Kabakçı Yurdakul & Odabaşı, 2013; Öztürk, 2013).

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In the education of new generations, it is seen that there is a changing towards pedagogical technological models instead of an education using only technological tools, which is a technology-oriented model (Gedik, Sönmez, & Yeşiltaş, 2019; Karadeniz & Vatanartıran, 2015; Mishra & Koehler, 2006). While the objective of technology-oriented models is helping teachers get knowledge and skills for the usage of technology, pedagogical technological models' objective is for the teachers to associate their knowledge of technology using with their pedagogical knowledge (Mishra & Koehler, 2006; Niess, 2005; Pamuk, Ülken, & Dilek, 2012).

Pedagogy is an activity purposely conducted by a specified person in order to make another person learn (Kurt, 2013; Watkins & Mortimore, 1999). In addition, pedagogical knowledge can be considered as teaching knowledge in general (Mishra & Koehler, 2006). Subjects such as classroom management, lesson planning, learning of student and evaluation methods are part of this field. Pedagogical knowledge is "how" it is taught to student rather than "what" is (Cavin, 2008). In this context, teachers having basic information on digital tools and actively using them in the process of education form the digital pedagogy (Kabakçı Yurdakul & Odabaşı, 2013; Mishra & Koehler, 2006).

Depending on their functions, organizational forms, necessary knowledge and skills, payments taken and values in the eye of society; many of the professions either continue their existence or disappear in time (Geist & Hoy, 2004; Swisher & Page, 2005). However, professions can continue to exist with professionalism, which brings personal and social functionality (İlhan, 2004; Yılmaz & Altinkurt, 2015). Teaching is among the professions still existing by transforming. This process that started with babysitting continues its existence as a professional field of study (Kutluca & Birgin, 2007). In this context, one of the notions overemphasized in recent years is the professionalism of teachers. Professionalism is the individual professionalism leaving its place to the organizational professionalism (Yaman, Aydemir & Demirtaş, 2013). In other words, the professionalism can be defined as doing one's duty by having the necessary skills and facts of the profession in the best way possible. Despite the

rapid social changes and technological developments nowadays, teachers are expected to be competent and professional at their job (Beaumont-Walters & Soyibo, 2001; So & Kim, 2009). Consequently, by recognizing the new educational technology, teachers must have knowledge of that area to determine whether the children coming to school are using the educational technology in the correct and efficient way (Mishra & Koehler, 2006; Schmidt et al., 2009). Moreover, this is related to teacher's pedagogical digital education (Willett, 2007). These innovations in education block the traditional arguments putting forward the impossibility of pedagogy and technology becoming integrated (Kabakçı Yurdakul & Odabaşı, 2013).

Rapid changing process in social structure, developments in information and technology fields have caused a new teacher type to be born in developed societies (Gökçe, 2003; Pamuk et al., 2012). In many states of United States of America, gaining competence in usage of technology in education has been made obligatory to get teaching certificate or diploma (Aksoy, 2003; Kabakçı Yurdakul & Odabaşı, 2013). Hence, teachers of the time are expected to have enough pedagogical knowledge convenient for those they address; and enough professionalism and digital competence to meet the requirements of time (Gedik, Sönmez, & Yeşiltaş, 2019; Yaman, Aydemir & Demirtaş, 2013). Teachers keeping pace with digital era is a pedagogical necessity and has a great importance in terms of their professionalism. In this direction, classroom teachers are also required to use technology effectively (Kaya & Dağ, 2013; Kula, 2015).

As in other departments of the faculties of education, it is seen that also in classroom teaching departments, it is aimed to have teachers gain skills to use digital tools within the curriculum of "Information Technologies", "Instructional Technology and Design" and "Special Teaching Methods". These executions point out that preservice teachers of today are not far from digital pedagogy. Starting from this point of view, the main objective of the research is to determine the preservice elementary school teachers' professionalism levels and competences of using/creating digital tools. So, the main objective of the research is to reveal the relationship between

preservice teachers' professionalism levels and pedagogical digital competences. In the direction of this objective, questions below were examined:

1. Do the professionalism levels and pedagogical digital competences of preservice teachers expressively differentiate according to their gender, age, class level, time (hour) of using computer and internet?
2. Is there a meaningful relationship between the professionalism levels and pedagogical digital competences of preservice teachers?
3. Are the pedagogical digital competences of preservice teachers meaningful predictors of their professionalism levels?

Method

Model of the Research

This the research was carried out using descriptive and relational survey model in accordance with the quantitative research structure. In the direction of the quantitative data, overall tendency, attitude, and opinions in the universe are studied to describe without making any changes on the sample in survey model (Creswell, 2013). In addition, one of the quantitative research methods, relational survey model was used in accordance with the aim of the research. Relational studies are studies in which the relationship between two or more variables is examined without any interference with these

variables. (Büyüköztürk et al., 2018). The aim is to study if the pedagogical digital competences of preservice teachers are meaningful predictors of their professionalism levels using relational survey model. Therefore, the quantitative research methods; descriptive and relational survey model were used in the process of the research done. In this direction, professionalism levels and pedagogical digital competences of preservice teachers were correlatively studied in terms of variables such as gender, age, class level, time of using computer and internet, and presented with a descriptive and relational point of view.

Sample

204 preservice elementary school teachers studying in Niğde in the academic year of 2019-2020 take place in the working area of the research. Convenience sampling method was used to represent the working area of the research. Convenience sampling is a method frequently used to achieve the highest saving while meeting the size and qualities required for the research (Büyüköztürk et al., 2018). In this direction, 204 preservice elementary school teachers take place in the sample of the research. Patterns of preservice elementary school teachers taking place in the sample are shown in Table 1 in terms of independent variables of the research.

Table 1 Patterns of Preservice Elementary School Teachers in Terms of Variables

Gender		Class Level		Age		Computer-Internet Use (Hour)		
Female	Male	3Rd Grade	4Th Grade	18-21	22-24	0-3	4-7	8-11
139	65	102	102	129	75	75	108	21
204		204		204		204		

As stated in Table 1, 139 of the preservice elementary school teachers taking place in the sample are female, 65 are male. In terms of class level, 102 of them are 3rd, 102 are 4th grade. In terms of age variable, there are 129 candidates between 18-24, and 75 between 22-24. According to the time of computer and internet use, 75 of the preservice teachers stated "0-3", 108 of them stated "4-7" and 21 stated "8-11".

Data Collection Tools

During the process of research, the data were

collected using "Personal Information Form" created by researchers; "Preservice teachers' Professionalism Scale" developed by Yılmaz and Altinkurt, consisting of four sub-dimensions; and "Preservice Teachers' Pedagogical Digital Competence Scale" (PTPDCS) developed by Yaman, Aydemir and Demirtaş consisting of three sub-dimensions. Containing four questions about gender, class level, age, time of using computer and internet use of preservice elementary school teachers, "Personal Information Form" involves independent variables. Developed in five points Likert type, Preservice teachers'

Professionalism Scale has 24 items under dimensions of personal growth, professional awareness, contribution to the institution, and emotional labor. Also developed in five points Likert type, Preservice teachers' Pedagogical Digital Competence Scale consists of 19 items under dimensions of educational-pedagogical digital competence, general pedagogical digital competence, and web pedagogical digital competence.

Data Collection

In the research process, the data were acquired from 204 preservice elementary school teachers studying in Niğde during fall semester of 2019-2020. During the data collection process, scale was applied to 102 third and 102 fourth grade students studying at Niğde Ömer Halisdemir University, Education Faculty, Classroom Teaching Department. In advance of the data collection, preservice teachers were shared the aim of the study and asked to fill up the forms. Preservice teachers who were not voluntary, who did not answer the data collection forms or who gave the same answer more than once were not included in the research. At the end of the data collection process, it was seen that data from 204 preservice elementary school teachers were evaluable.

Analysis of Data

The data acquired from the scales used in the research were analyzed with SPSS 20 package software of analysis. After the corrections, the analysis was done in the direction of 204 students who participated in the research. t-Test was made according to variables of gender, class level and age in the personal information form; and one-way analysis of variance was realized in the analysis in terms of time of computer and internet use.

Correlation analysis was performed to reveal the relationship between "Pedagogical Digital Competences" and "Teachers' Professionalism Levels" of preservice elementary school teachers, and regression analysis was done to reveal the predictiveness between them.

Validity and Reliability

At first in the research, PTPDC scale, was

used. Exploratory factor analysis was performed for Pedagogical Digital Competence Scale and a three-factor structure was achieved which explained 55,6% of the total variance. After the exploratory and confirmatory factor analysis, the model consisting of 19 items and three factors was revealed to be theoretically and statistically convenient. To determine the reliability of Pedagogical Digital Competence Scale, internal consistency and split-half reliability methods were used. The analysis revealed that internal consistency coefficients for Pedagogical Digital Competence Scale was .91, for Digital Educational-Pedagogical Competence, Web Digital Pedagogical Competence and sub-dimensions in order given: .89, .81 and .76. Pedagogical Digital Competence Scale's split-half reliability coefficient was .88 for the whole scale, and for the sub-dimensions in order given: .85, .73 and .74. As a result of item analysis, the scale's total item correlations were seen to change between .46 and .66. Lastly, for "Preservice teachers' Professionalism Scale" consisting of four sub-dimensions and developed by Yılmaz and Altınkurt (2014), the coefficient in for the "personal growth" factor was calculated as .79, as .74 for "professional awareness" factor, as .86 for "contribution to the institution" factor, as .80 for "emotional labor" factor, and as .90 for the whole scale. In short, it was determined that α coefficients change between .74-.86. The internal consistency coefficients calculated show that reliability of the scales is high.

To provide reliability in the process of data collection, preservice elementary school teachers were informed on the subject in the first instance. Preservice teachers were informed on how to fill the scales. In addition to this, the data of the voluntary students were put into perspective to verify the authenticity of the data collected from students.

Findings

In this part, findings reached in the data analysis process are shown as tables. As a beginning, the t-Test and ANOVA results of the points preservice elementary school teachers got from the dimensions of Pedagogical Digital Competence Scale and Preservice teachers' Professionalism Scale were presented, and then the relationship between

pedagogical digital competence and professionalism level were expressed within the scope of sub-dimensions. Lastly, the findings of predictiveness between pedagogical digital competence and professionalism level.

t-Test and ANOVA results of the points preservice elementary school teachers got from the dimensions of Pedagogical Digital Competence Scale according to the independent variables of the research.

Table 2 t-Test Results of the Average Points Preservice Elementary School Teachers’ Pedagogical Digital Competences Got in Terms of Gender Variable

Sub-dimensions	Gender	N	X	S.s	t	p
GPDC	Female	139	23.3525	4.08579	-3,381	.001*
	Male	65	25.7385	5.79945		
EPDC	Female	139	28.0360	4.23992	-.670	.504
	Male	65	28.4923	5.10858		
WPDC	Female	139	19.6691	3.33925	-1,429	.155
	Male	65	20.3846	3.31988		

*p<.05 (GPDC=General Pedagogical Digital Competence. EPDC= Educational-Pedagogical Digital Competence. WDPC =Web Digital Pedagogical Competence)

According to Table 2 when the points from the Pedagogical Digital Competence Scale are analyzed, in terms of gender variable; it is indicated that there is a meaningful difference on behalf of male preservice teachers in the sub-dimension of “General Pedagogical Digital Competence”, yet there is no

other meaningful difference in other sub-dimensions. It can be concluded that male teacher candidates are more interested in digital tools in their daily lives and they can use this situation more effectively in the teaching environment.

Table 3 T-Test Results of the Average Points Preservice Elementary School Teachers’ Pedagogical Digital Competences Got in Terms of Class Level Variable

Sub-dimensions	Class Level	N	X	S.s	t	p
GPDC	3Rd grade	102	23.7941	4.34716	-.945	.346
	4Th grade	102	24.4314	5.24548		
EPDC	3Rd grade	102	27.8235	4.02077	-1,130	.260
	4Th grade	102	28.5392	4.97652		
WPDC	3Rd grade	102	19.4314	2.86843	-2,005	.046*
	4Th grade	102	20.3627	3.71187		

*p<.05 (GPDC=General Pedagogical Digital Competence. EPDC= Educational-Pedagogical Digital Competence. WDPC =Web Digital Pedagogical Competence)

According to Table 3 when the points from the Pedagogical Digital Competence Scale are analyzed, in terms of class level variable; it is indicated that there is a meaningful difference on behalf of 4th grade preservice teachers in the sub-dimension of “Web Digital Pedagogical Competence”, yet there is no other meaningful difference in other sub-dimensions.

The increase in the proficiency of using digital tools as the grade level rises can be interpreted as the fact that the number of courses with pedagogical content is higher than the pre-service teachers and they have more opportunities to get to know WEB tools in these courses.

Table 4 T-Test Results of the Average Points Preservice Elementary School Teachers' Pedagogical Digital Competences Got in Terms of Age Variable

Sub-dimensions	Age	N	X	S.s	t	p
GPDC	18-21	129	24.0310	4.62658	-.317	.751
	22-24	75	24.2533	5.15462		
EPDC	18-21	129	28.0775	4.33484	-.429	.668
	22-24	75	28.3600	4.86477		
WPDC	18-21	129	19.6124	3.16798	-1,602	.111
	22-24	75	20.3867	3.59013		

*p<.05 (GPDC=General Pedagogical Digital Competence. EPDC= Educational-Pedagogical Digital Competence. WDPC =Web Digital Pedagogical Competence)

According to Table 4 when the points from the Pedagogical Digital Competence Scale are analyzed, there are no meaningful differences in any of the sub-dimensions in terms of age variable. It can be concluded that the digital pedagogical competencies of the pre-service teachers do not differ significantly in terms of the age variable, since their grade levels are close to each other and show a heterogeneous distribution in terms of the age variable.

Table 5 Anova Results of the Average Points Preservice Elementary School Teachers' Pedagogical Digital Competences Got in Terms of Time of Computer and Internet Use Variable

Sub-dimensions	Comp-Internet Use (Hour)	N	X	S.s.	Sd	F	p	Meaningful Difference
GPDC	0-3	75	22.3467	4.60462	2/201	14,980	.000*	A-B. A-C
	4-7	108	24.5370	4.37159				
	8-11	21	28.2381	4.91838				
EPDC	0-3	75	26.8267	4.05160	2/201	6,646	.002*	A-B. A-C
	4-7	108	28.7222	4.45713				
	8-11	21	30.2381	5.30004				
WPDC	0-3	75	18.8533	2.68476	2/201	8,415	.000*	A-B. A-C
	4-7	108	20.2407	3.63233				
	8-11	21	21.8571	2.70713				

*p<.05 (A= 0-3. B= 4-7. C= 8-11) (GPDC=General Digital Pedagogical Competence. EPDC= Educational-Pedagogical Digital Competence. WDPC =Web Digital Pedagogical Competence)

According to Table 5 when the points from the Pedagogical Digital Competence Scale are analyzed, it is indicated in all sub-dimensions that "4-7" hours of use meaningfully differs from "0-3"; "8-11" level of usage meaningfully differs from "0-3" hours of use. It can be concluded that the more time the prospective teachers spend with computers and the internet, the higher their digital pedagogical competencies.

Table 6 T-Test Results of the Average Points Preservice Elementary School Teachers' Professionalism Levels Got in Terms of Gender Variable

Sub-dimensions	Gender	N	X	S.s	t	p
PG	Female	139	16.8201	3.45206	.528	.598
	Male	65	16.5231	4.31606		
PA	Female	139	21.9640	3.37169	2,851	.005*

PA	Male	65	20.3846	4.28913		
CI	Female	139	30.5540	4.70457	.000	1,000
	Male	65	30.5538	5.01258		
EL	Female	139	24.9640	4.80098	1,845	.066
	Male	65	23.6615	4.46611		
*p<.05 (PG=Personal Growth. PA= Professional Awareness. CI=Contribution to the Institution. EL=Emotional Labor)						

According to Table 6, when the points from Preservice teachers’ Professionalism Scale are analyzed, it is indicated that there is a meaningful difference in the sub-dimension of “Professional Awareness” on behalf of female preservice teachers,

yet there are no other meaningful differences in other sub-dimensions. It can be concluded that female pre-service teachers have more professional sensitivity than male pre-service teachers.

Table 7 T-Test Results of the Average Points Preservice Elementary School Teachers’ Professionalism Levels Got in Terms of Class Level Variable

Sub-dimensions	Class Level	N	X	S.s	t	p
PG	3Rd grade	102	16.9510	3.45086	.860	.391
	4Th grade	102	16.5000	4.01421		
PA	3Rd grade	102	21.3333	3.68119	-.484	.629
	4Th grade	102	21.5882	3.83407		
CI	3Rd grade	102	29.9706	4.73758	-1.747	.082
	4Th grade	102	31.1373	4.79901		
EL	3Rd grade	102	23.9902	4.46880	-1,697	.091
	4Th grade	102	25.1078	4.92701		
*p<.05 (PG=Personal Growth. PA= Professional Awareness. CI=Contribution to the Institution. EL=Emotional Labor)						

According to Table 7, when the points from Preservice teachers’ Professionalism Scale are analyzed, in terms of class level variable it is seen that there are no meaningful differences in any of the sub-

dimensions. In terms of vocational professionalism levels, it can be concluded that there is no significant difference between the professionalism levels, since the grade levels of the teacher candidates are consecutive classes.

Table 8 T-Test Results of the Average Points Preservice Elementary School Teachers’ Professionalism Levels Got in Terms of Age Variable

Sub-dimensions	Age	N	X	S.s	t	p
PG	18-21	129	17.0465	3.71833	1,614	.108
	22-24	75	16.1733	3.73939		
PA	18-21	129	21.4806	3.75645	.099	.921
	22-24	75	21.4267	3.76748		
CI	18-21	129	30.1008	4.72666	-1,781	.076
	22-24	75	31.3333	4.83605		
EL	18-21	129	24.3411	4.76067	-.824	.411
	22-24	75	24.9067	4.67360		
*p<.05 (PG=Personal Growth. PA= Professional Awareness. CI=Contribution to the Institution. EL=Emotional Labor)						

According to Table 8, when the points from Preservice teachers' Professionalism Scale are analyzed, in terms of age variable it is seen that there are no meaningful differences in any of the sub-dimensions. It can be concluded that the professional

professionalism levels of the teacher candidates do not differ significantly in terms of the age variable, since the grade levels of the teacher candidates are close to each other and there is a heterogeneous distribution in terms of the age variable.

Table 9 Anova Results of the Average Points Preservice Elementary School Teachers' Professionalism Levels Got in Terms of Time of Computer and Internet Use Variable

Sub-Dimensions	Comp-Internet Use (Hour)	N	X	S.s.	Sd	F	p	Meaningful Difference
PG	0-3	75	16.6000	3.56787	2/201	.221	.802	
	4-7	108	16.8796	3.51690				
	8-11	21	16.3810	5.33363				
PA	0-3	75	20.8933	3.51281	2/201	1,481	.230	
	4-7	108	21.8611	3.74530				
	8-11	21	21.4286	4.47852				
CI	0-3	75	29.4667	4.41231	2/201	3,121	.046*	
	4-7	108	31.2037	4.90233				A-B
	8-11	21	31.0952	5.04881				
EL	0-3	75	24.1067	4.62827	2/201	1,033	.358	
	4-7	108	24.6204	4.99480				
	8-11	21	25.7619	3.40448				

*p<.05 (A= 0-3. B= 4-7. C= 8-11) (PG=Personal Growth. PA= Professional Awareness. CI=Contribution to the Institution. EL=Emotional Labor)

According to Table 9, it is seen that "4-7" hours of use meaningfully differs from "0-3" hours of use. It can be expressed that there are no meaningful differences in other sub-dimensions. It can be concluded that there is not a single variable in the effect of the time of computer and internet use on the professional professionalism levels of teacher candidates.

According to Table 10, it is seen that there is a positive meaningful relationship between sub-dimensions of preservice elementary school teachers' pedagogical digital competences and sub-dimensions of teaching professionalism levels. Therefore, it can be concluded that the increase in the digital pedagogical competence levels of teacher candidates is directly related to the increase in their vocational professionalism level.

Table 10 Results of Correlation Analysis on the Relationship Between Professionalism Levels and Pedagogical Digital Competences of Preservice Elementary School Teachers

	PG	PA	CI	EL
GPC	.266**	.199**	.270**	.270**
EPDC	.335**	.602**	.516**	.531**
WPDC	.243**	.543**	.537**	.562**
**p<.01				

According to Table 11, it is seen that preservice elementary school teachers' pedagogical digital competences are meaningful predictors of their teaching professionalism levels. In case of an improvement on pedagogical digital competences of preservice teachers, it can be said that their teaching professionalism levels also improve.

Table 11 Results of Multiple Regression Analysis on the Predictiveness of Pedagogical Digital Competences of Preservice Elementary School Teachers on their Professionalism Levels

Dependent Variables	Predictor Variables	B	Standard Error	β	t	R ²	p
PG	Fixed	7,928	1,722		4,603	.12	.000**
	GPDC	.109	.059	.140	1,842		.067
	EPDC	.231	.079	.280	2,910		.004*
	WPDC	-.017	.106	-.016	-.165		.869
PA	Fixed	6,975	1,424		4,899	.41	.000**
	GPDC	-.116	.049	-.149	-2,375		.018*
	EPDC	.401	.066	.484	6,109		.000**
	WPDC	.300	.087	.268	3,440		.001**
CI	Fixed	12,688	1,939		6,544	.33	.000**
	GPDC	-.015	.067	-.015	-.228		.820
	EPDC	.296	.089	.279	3,307		.001**
	WPDC	.497	.119	.347	4,182		.000**
EL	Fixed	6,392	1,874		6,392	.35	.001**
	GPDC	-.028	.064	-.029	-.028		.662
	EPDC	.288	.086	.276	.288		.001**
	WPDC	.538	.115	.381	.538		.000**

*p<.05. ** p<.01

Results, Conclusion and Discussion

When the average score of the scales is analyzed, preservice elementary school teachers’ levels of pedagogical digital competences and teaching professionalism levels were detected high. While there is a significant difference on behalf of 4th grades according to class level variable in the “Web Digital Pedagogical Competence” sub-dimension of Pedagogical Digital Competence Scale, there is no other significant difference in other sub-dimensions. There is also no significant difference in all sub-dimensions according to the class level variable in the Teachers’ Professionalism Scale, according to the findings. There was no significant difference in the 3rd and 4th grade students’ pedagogical digital competences and professionalism levels. Evidently, preservice teachers have taken numerous courses related to this field up to their class levels (3rd and 4th grade). In Akkoyunlu and Kurbanoğlu’s (2003) research on preservice teachers, it was observed that higher grades have higher levels of competence. Similarly, in the research conducted by Gedik, Sönmez, and Yeşiltaş (2019), it was pointed out that the knowledge and competences of higher-grade preservice teachers, 3rd and 4th grades were

comparable. Based studies conducted, it is believed that these competences will be lower in the first years (grades 1 and 2) of preservice teachers’ education process, yet as they progress to higher grades, their level of knowledge and skills will advance depending on their knowledge and experience.

When analyzing the scores of Teachers’ Professionalism Levels scale, there is no significant difference in the sub-dimensions according to age variable. Again, when analyzing the scores of Pedagogical Digital Competence Scale, the conclusion is that there is no significant difference in the sub-dimensions according to age variable. Although the ages of preservice teachers in the study are different, the fact that they have gone through the same educational process and are in the same age range can be expressed as the reason why their competences have not changed. When the scores of Pedagogical Digital Competence Scale were analyzed, it is found that although there are significant differences in the sub-dimension of “General Pedagogical Digital Competence” among male preservice teachers, there are no other significant differences in other sub-dimensions. When we looked through the literature, we found

studies that showed male preservice teachers had more competence than female preservice teachers because they were more interested in technology and digital tools, which matched the study's findings (Bal & Karademir, 2013; Gedik, Sönmez, & Yeşiltaş, 2019; Tokar, 2005). Furthermore, when the Preservice Teachers' Professionalism Levels scale scores are examined, it is discovered that there is a significant difference in favor of female preservice teachers in the "Professional Awareness" sub-dimension, but no significant difference in the other sub-dimensions. When it was looked into studies related with professionalism, it was discovered that female teachers and preservice teachers have a higher level than male preservice teachers (Balıkçı, 2004; Lin, Tsai, Chai & Lee, 2013; Ocaklı, 2006; Yılmaz & Altinkurt, 2015). According to the study by Taşdan (2013), female teachers are more interested in professional change and development than male teachers, and as a result, their professionalism levels are higher, which is partially comparable with the findings of this study. In general, among the seven sub-dimensions examined within the scope of this research, there was no significant difference in the pedagogical digital competences and professionalism levels of preservice teachers in terms of gender. There are also research results that support this result, and it is observed that due to several variables in the sample group, there is no significant difference in gender between female preservice teachers and female preservice teachers (Büyükalın, Gedik, & Erol, 2020; Chai, Koh & Tsai, 2010; Horzum, 2013; Karadeniz & Vatanartıran, 2015; Kula, 2015; Öztürk, 2013).

When checking the scores obtained on the Pedagogical Digital Competence Scale, it can be seen in all sub-dimensions in terms of the time of computer use variable that the "4-7" (hours) is significantly different from the time of use "0-3" and the "8-11" time of use is significantly different from the "0-3" time of use. Furthermore, when the Teachers' Professionalism Scale scores were examined, it was determined that the "4-7" hours in the "Contribution to the Institution" sub-dimension differed significantly from the "0-3" time of use in terms of the time of use computer and internet variable. The variable that shows the most significant

difference among the research dimensions is time of use computer and internet, and it can be stated that possession of digital material and spending time is a basic factor affecting both competence and professionalism, and when studies in the literature are examined, those with similar outcomes are found (Kabakçı Yurdakul, 2011; Kuzu & Erten, 2014; Kula, 2015).

It can be observed that there is a positive correlation between the Pedagogical Digital Competence sub-dimensions and the sub-dimensions of the Teaching Professionalism Levels of the preservice elementary school teachers. Preservice elementary school teachers' Pedagogical Digital Competences can be stated as significant predictors of their Teaching Professionalism Levels. According to Karalar and Aslan Artan (2016), an increase in preservice elementary school teachers' technological pedagogical content knowledge levels is an important predictor of teacher self-efficacy. Similarly, Gedik (2017) pointed out that the ability of future elementary school teachers to use technological tools in the educational process significantly affects and predicts their professionalism and self-efficacy perceptions for the teaching profession. The main purpose of the study, which is the result of examining the relationship between the digital pedagogical competencies of teacher candidates and their vocational professionalism levels, is that these two variables are significantly related to each other. Because of current conditions it is inevitable that teachers have to carry digital tools for educational environments from a professional point of view. In order to be professionally successful and productive, teachers and pre-service teachers will directly affect their professional professionalism if they recognize the digital tools developed and use these tools adequately in instructional environments. The result obtained in the research can be interpreted as the higher the pre-service teachers' competencies towards digital pedagogical tools, the more they affect their vocational professionalism levels.

Therefore, by conducting research with elementary school teachers, teachers of different branches, and preservice teachers, the generalizability of research results can be increased. According to the research findings, one of the research proposals is to

provide teachers who can keep up with the digital age with courses at the bachelor's degree level on pedagogical digital and technology-based education models, or to provide in-service training for teachers. In addition, by examining the variables that affect the vocational professionalism levels of teachers and teacher candidates, studies can be carried out to increase their professionalism levels.

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