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Identifying Web Pedagogical Content Knowledge (W-PCK) Level of Early Childhood Teachers

Araştırma Makalesi / Research Article

Sühendan ER, TED Üniversitesi
Meltem Huri BATURAY, Atılım Üniversitesi
Mehtap TUFAN, Atılım Üniversitesi

Abstract

Qualified teachers are expected to have competence in content knowledge as well as pedagogical knowledge. In the age of technology in order to create better teaching and learning process, it is also vital for teachers having web pedagogical content knowledge. In this study it is aimed to define web pedagogical content knowledge level of early childhood teachers. The participants of the study are 60 early childhood teachers from Çankaya province of Ankara who work both in state and private schools. Web Pedagogical Content Knowledge Scale which is developed by Lee, Tsai and Chang (2008) and adapted to Turkish by Hor¬zum (2011) is used in the study. The scale is consisted of 30 items and 5 factors. The sub items are web-general, web-communicative, web-pedagogical knowledge, web-pedagogic content knowledge and attitudes towards web-based instruction. Besides, a general information form is delivered which is consisted of the age, graduation, teaching experience, computer availability at home, Internet access at home, computer availability at school and Internet access at school. In this study, all the correlations between these data are analyzed and the results are discussed.

Keywords

Internet,
Pre-school teachers,
Web pedagogical content knowledge.

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Okul Öncesi Öğremenlerinin Web Pedagojik İçerik Bilgisi Seviyelerinin Belirlenmesi

Öz

Nitelikli öğretmenlerin pedagojik bilginin yanı sıra alan bilgisine de sahip olmaları beklenir. Teknoloji çağında daha iyi öğretme ve öğrenme süreci oluşturmak için, öğretmenlerin web pedagojik içerik bilgisine sahip olmaları önemlidir. Bu çalışmada okul öncesi öğretmenlerinin web pedagojik içerik bilgi düzeylerinin belirlenmesi amaçlanmıştır. Araştırmanın katılımcıları, Ankara'nın Çankaya ilçesinde, hem devlet hem de özel okullarda çalışan 60 okul öncesi öğretmenidir. Araştırmada Lee, Tsai ve Chang (2008) tarafından geliştirilen ve Horzum (2011) tarafından Türkçe'ye uyarlanan Web Pedagojik İçerik Bilgisi Ölçeği kullanılmıştır. Ölçek 30 madde ve 5 faktörden oluşmaktadır. Alt maddeler web-genel, web-iletişimsel, web-pedagojik bilgi, web-pedagojik içerik bilgisi ve web-tabanlı eğitime yönelik tutumlardır. Ayrıca yaş, mezuniyet, öğretmenlik deneyimi, evde bilgisayar ve internet erişimi, okulda bilgisayar ve internet erişimine ait sorulardan oluşan genel bilgi formu verilmiştir. Bu çalışmada, bu veriler arasındaki tüm korelasyonlar analiz edilmiş ve sonuçlar tartışılmıştır.

Anahtar Kelimeler

İnternet,
Okul öncesi öğretmenleri,
Web pedagojik içerik bilgisi.

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Introduction

In the 21st century, technology has an effect on each and every field of life and also on education. It is assumed that teaching and learning process will become more effective and engaging by the help of digital resources (Tsai, 2004). Digital resources should be accepted not only as a library that everyone can reach at any time but also a way that enables people gain new learning experiences (Shin et al., 2009). From this perspective, it is preferable for teachers using the Internet for improving themselves in their professional area. Simply, teachers can join in webinars or search on several professional development sites that will lead them have more qualified teaching. In order to reach this goal, teachers need to be competent in using the Internet (Horzum, 2011).

Web content knowledge illustrates a teacher's knowledge about the manner to take the features and the advantages of web into the content i.e subject matter. (Lee and Tsai, 2010). Tsai (2004) claimed that the Internet/web are perceived by people in different ways. It can be a tool, a form of technology or a toy. Accordingly, Web is considered to be a tool of technology which is used by people in various areas such as teaching with the web that is a specific area of educational technology. As Chou and Tsai (2002) stated that web usage leads new horizons for the design, development, storage, distribution and access to learning materials. Web is considered to be a highly important tool of contemporary education. Rapid advances in Web enables the availability of various tools to support teaching and learning (Lee and Tsai, 2005). Web offers interesting and exciting ways for acquiring instructional information and learning resources in teaching and learning activities. For Jain and Getis (2003), Web is a powerful communication tool especially in distance education. In this research distance education is not the main concern. Wallace (2004) similarly implies that Web is a source of information, a means of content, communication and a site of collaboration. It can be concluded that web provides a rich source for teachers whereas it brings new challenges to teachers' pedagogical practice

Shulman (1986) who developed pedagogical content knowledge term advocates that teachers should have both pedagogical and content knowledge in order to create an effective teaching and learning environment. Content knowledge may be defined as the part that is going to be taught. Pedagogical knowledge, on the other hand, involves knowledge about the process, application on teaching and learning techniques. Besides these, Mishra and Koehler (2006) believe that by interaction of technology and pedagogical content knowledge, a more effective learning environment can be created. As a result, technological pedagogical content knowledge (TPACK) model is introduced by them. Later, Lee, Tsai and Chang (2008) introduced web pedagogical content knowledge, as web is often used in today's daily learning contexts. Web knowledge involves general web competencies such as the usage of web tools or web-based communication and interaction. For Lee and Tsai (2010) web pedagogical content knowledge is formed by the combination of four components. These are pedagogical content knowledge, web pedagogical knowledge, web content knowledge and web pedagogical content knowledge. Pedagogical content knowledge is important as it necessities pedagogical competency of the teachers in teaching any content. Web pedagogical knowledge is the combination of pedagogy and web in teaching mediums. Web content knowledge is the combination of content with web properties and finally, web pedagogical content knowledge is concerned with teaching of content with the integration of web properties and its advantages.

W-PCK is defined as web knowledge for teaching and it seems to be essential regarding the requirements of the 21st century. Today while we are experiencing extraordinary days with regard to Covid 19 danger, students are not going to school and they are receiving online education. In this case the teachers are expected to have competency in using educational web programs and it is in line with educational goals. In W-PCK, the significant issue is to compose pedagogical and content knowledge and use the web to support them in a meaningful way both in classrooms and online. In other words, W-PCK competence is the ability to combine pedagogy, web and content knowledge to create a fruitful learning and teaching environment (Bağcı and Atar, 2019).

Although there are several research on TPACK, there are few studies conducted on W-PCK most of which are done with preservice teachers (Jimoyiannis, Tsiotakis, Roussinos, & Siorenta, 2013; Gömleksiz, & Erten, 2013; Ekici, İnel Ekici, & Altunışık, 2015; Turan, & Koç, 2016; Hiğde, Uçar, & Demir, 2014; Karataş, & Aslan-Tutak, 2017; Akar & Güzin, 2019; Oskay, & Odabaşı, 2016; Yeşiltaş, 2016). Among the limited number of researches, there is no research done with preschool teachers. For example Korucu (2017) done with 96 teachers none of whom are preschool teacher and Yeşiltaş(2016) worked with perception of W-PCK of social science teachers.

It is crucial for teachers having web pedagogical content knowledge in order to raise today's learners who are digitally whiz individuals. It is a fact that teachers have significant importance on the performance of their students. By 2006, early childhood education has started to gain importance with the renewal of the preschool education program and early childhood teachers have been expected to combine technology with their teaching (Haktanır, 2018). This issue has also been given much more importance within vision of 2023, announced by the government in 2018. With this perspective, the current study aimed to identify web pedagogical content knowledge level of early childhood teachers.

Methodology

Participants

The survey was administered to a total of 60early childhood teachers. The teachers work for different schools in Çankaya region of Ankara. All of the participants were female.

Instruments

The data has been collected using the Web Pedagogical Content Knowledge scale (W-PCK) which was originally developed by Lee, Tsai and Chang (2008) and adapted into Turkish by Horzum (2011). Data has been collected from voluntary participants who were informed of the purpose of the study and their responses were kept anonymous. The instrument is a 30-item five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = strongly agree) consisting of 5 sub-scales: Web-general, Web Communicative, Web-pedagogical knowledge (WPK), Web-Pedagogical Content Knowledge (W-PCK) and Attitudes towards Web–based instruction. The overall reliability (Cronbach's alpha) of the scale was measured by Horzum (2011) as 0.94 also the coefficients of sub-scales were found to be as follows: 1) Web-general (α = 0.88) 2) Web Communicative (α = 0.91) 3) Web-pedagogical knowledge (α = 0.95) 4) Web-Pedagogical Content Knowledge (α = 0.90) 5) Attitudes towards Web-based instruction (α = 0.92).

Besides the scale, demographics information (age, gender, graduation degree, computer availability at home, Internet access at home, computer availability at school, Internet access at school) was collected under the general information form.

Data analysis

The data was computerized and analysed with inferential statistics by using Statistical Package for Social Sciences (SPSS) 24.0. To explore the correlations between the pre-school teachers' W-PCK competencies, the participants' responses were analysed via Kruskal Wallis and Mann Whitney U Tests.

Findings

Table 1. The correlation between preschool teacher's age and W-PCK

Factors	Age Group	N	Mean Rank	Df	X^2	P
Web – General	20-25	26	31,34	5	3,761	,584
	26-30	12	28,09			
	31-35	9	26,19			
	36-40	4	25,17			
	41-45	6	18,75			
	Over 46	3	25,00			
Web – Communicative	20-25	26	33,02	5	8,637	,124

	26-30	12	25,18			
	31-35	9	28,88			
	36-40	4	24,67			
	41-45	6	20,17			
	Over 46	3	5,75			
Web – Content Knowledge	20-25	26	31,52	5	7,460	,189
	26-30	12	26,27			
	31-35	9	29,88			
	36-40	4	29,33			
	41-45	6	18,17			
	Over 46	3	13,50			
Web – Pedagogical-Content Knowledge	20-25	26	34,12	5	13,145	,022
	26-30	12	21,50			
	31-35	9	22,44			
	36-40	4	39,00			
	41-45	6	18,33			
	Over 46	3	22,00			
Attitude Toward Web-based Instruction	20-25	26	31,94	5	8,509	,130
	26-30	12	25,18			
	31-35	9	22,81			
	36-40	4	41,00			
	41-45	6	22,25			
	Over 46	3	12,75			
Total		60				

There is a significant difference between web pedagogical-content knowledge and preschool teachers' age. Web-Pedagogical-Content Knowledge of pre-school teachers was found to be significant with respect to their ages. Although teachers' Web-Pedagogical-Content Knowledge increases between the age group 36-40, this changes between the years of 41-45 as in the case for 26-35.

Table 2. The correlation between early childhood teachers' graduation degree and W-PCK

Factors	**Graduation Degree**	**n**	**Mean Rank**	**Df**	**X^2**	**P**
Web-General	Vocational High School	16	27,57	4	6,212	,184
	High School	6	26,90			
	Associate's Degree	11	35,55			
	Bachelor Degree	20	22,53			
	Master's Degree	7	34,75			
Web-Communicative	Vocational High School	16	30,57	4	2,073	,722
	High School	6	26,60			
	Associate's Degree	11	29,95			
	Bachelor Degree	20	24,16			
	Master's Degree	7	31,67			
Web- Content Knowledge	Vocational High School	16	26,40	4	4,259	,372
	High School	6	29,10			
	Associate's Degree	11	23,55			
	Bachelor Degree	20	28,32			
	Master's Degree	7	37,50			
Web- Pedagogical - Content Knowledge	Vocational High School	16	28,13	4	,484	,975
	High School	6	28,60			
	Associate's Degree	11	28,55			
	Bachelor Degree	20	26,53			
	Master's Degree	7	30,92			
Attitude toward web-based instruction	Vocational High School	16	32,37	4	2,410	,661
	High School	6	27,50			
	Associate's Degree	11	23,45			
	Bachelor Degree	20	26,79			
	Master's Degree	7	28,92			
Total		60				

There is no significant difference between early childhood teachers' graduation degree and W-PCK.

Table 3. The correlation between preschool teachers' teaching experience and W-PCK

Factors	Teaching Experience	N	Mean Rank	Df	X^2	P
Web – General	Less than 1 year	17	31,13	4	4,974	,290
	1-3 year	9	31,69			
	3-5 year	12	31,32			
	5-10 year	10	20,00			
	Over 10 year	12	24,00			
Web – Communicative	Less than 1 year	17	32,72	4	5,773	,217
	1-3 year	9	30,56			
	3-5 year	12	31,09			
	5-10 year	10	23,33			
	Over 10 year	12	20,00			
Web – Content Knowledge	Less than 1 year	17	34,34	4	12,590	,013
	1-3 year	9	30,06			
	3-5 year	12	32,00			
	5-10 year	10	23,00			
	Over 10 year	12	17,36			
Web – Pedagogical-Content Knowledge	Less than 1 year	17	34,63	4	7,917	,095
	1-3 year	9	27,06			
	3-5 year	12	30,41			
	5-10 year	10	20,22			
	Over 10 year	12	23,00			
Attitude Toward Web-based Instruction	Less than 1 year	17	30,28	4	12,096	,017
	1-3 year	9	30,94			
	3-5 year	12	37,77			
	5-10 year	10	18,06			
	Over 10 year	12	20,91			
Total		60				

There is a significant difference between preschool teachers' teaching experience and Web-Content Knowledge. Particularly, the Web-Content Knowledge of participants with over 10 years teaching experience is the half of the participants with less than 1-year teaching experience. Similarly, attitude toward web-based instruction decreases as the participants get older. Five years experience in this attitude seems to be an indicator of decrease since 5 year and older participants' attitude levels remarkably decrease.

Table 4. Preschool teachers' having or not having computer access at home

Factors	Having Computer at Home	n	Mean Rank	Sum of Ranks	U	Z	P
Web – General	Yes	52	28,48	1395,50	123,500	-,672	,502
	No	8	24,08	144,50			
Web – Communicative	Yes	52	28,87	1414,50	104,500	-1,175	,240
	No	8	20,92	125,50			
Web – Content Knowledge	Yes	52	28,88	1415,00	104,000	-1,369	,171
	No	8	20,83	125,00			
Web – Pedagogical-Content Knowledge	Yes	52	29,47	1444,00	75,000	-2,196	,028
	No	8	16,00	96,00			
Attitude Toward Web-based Instruction	Yes	52	29,17	1429,50	89,500	-1,682	,093
	No	8	18,42	110,50			
Total		60					

There is a significant difference between early childhood teachers' computer access at home and Web pedagogical content knowledge.

Table 5. Preschool teachers' having or not having Internet access at home

Factors	Having Internet at Home	N	Mean Rank	Sum of Ranks	U	Z	P
Web – General	Yes	49	29,78	1370,00	125,000	-1,976	,048
	No	11	18,89	170,00			
Web – Communicative	Yes	49	29,04	1336,00	159,000	-1,118	,264
	No	11	22,67	204,00			

Web – Content Knowledge	Yes	49	28,93	1331,00	164,000	-1,154	,249
	No	11	23,22	209,00			
Web – Pedagogical-Content Knowledge	Yes	49	30,13	1386,00	109,000	-2,518	,012
	No	11	17,11	154,00			
Attitude Toward Web-based Instruction	Yes	49	28,79	1324,50	170,500	-,899	,368
	No	11	23,94	215,50			
Total		60					

There is a significant difference between early childhood teachers' Internet access at home and Web General and Web Pedagogical content knowledge.

It is clear that when there is computer and Internet at pre-school teachers' home, they are more prone to use them for the purpose of teaching. This finding is not very extraordinary, on the contrast, this is something expected to happen compared to teachers not having computers and Internet access available around.

Table 6. Preschool teachers' having or not having computer access at work/school

Factors	**Having Computer at Work**	**N**	**Mean Rank**	**Sum of Ranks**	**U**	**Z**	**P**
Web-General	Yes	46	27,81	1196,00	250,000	-,173	,863
	No	14	28,67	344,00			
Web-Communicative	Yes	46	28,74	1236,00	226,000	-,668	,504
	No	14	25,33	304,00			
Web- Content Knowledge	Yes	46	28,53	1227,00	235,000	-,553	,580
	No	14	26,08	313,00			
Web- Pedagogical - Content Knowledge	Yes	46	28,43	1222,50	239,500	-,426	,670
	No	14	26,46	317,50			
Attitude toward web-based instruction	Yes	46	28,74	1236,00	226,000	-,706	,480
	No	14	25,33	304,00			
Total		60					

There is no significant difference between early childhood teachers' computer access at work/school and W-PCK.

Table 7. Preschool teachers' having or not having Internet access at work/school

Factors	**Having Internet at Work**	**N**	**Mean Rank**	**Sum of Ranks**	**U**	**Z**	**P**
Web-General	Yes	53	28,07	1403,50	121,500	-,109	,914
	No	7	27,30	136,50			
Web-Communicative	Yes	53	28,24	1412,00	113,000	-,360	,719
	No	7	25,60	128,00			
Web- Content Knowledge	Yes	53	27,96	1398,00	123,000	-,069	,945
	No	7	28,40	142,00			
Web- Pedagogical - Content Knowledge	Yes	53	27,48	1374,00	99,000	-,860	,390
	No	7	33,20	166,00			
Attitude toward web-based instruction	Yes	53	27,15	1357,50	82,500	-1,348	,178
	No	7	36,50	182,50			
Total		60					

There is no significant difference between early childhood teachers' Internet access at work/school and W-PCK.

Discussion

In this research a significant difference between web pedagogical-content knowledge and preschool teachers' age was found. The teachers who are 36-40 and 20-25 have higher scores than other age groups. According to Shulman (1986), pedagogical content knowledge assert that it is essential for teachers to have both pedagogical and content knowledge to build an effective teaching and learning environment. Content knowledge is the part

to be taught, pedagogical knowledge constitutes the knowledge about the process, application on teaching and learning techniques. The interaction of technology and pedagogical content knowledge creates a more effective learning environment (Mishra and Koehler, 2006).According to Lee, Tsai and Chang (2008) Web-Content Knowledge seeks teachers' confidence in their knowledge about the manner in which the Web and content can mutually reinforce each other. In other words, teachers are able to do search on the Web in order to integrate the knowledge into the course content. The result shows us that the teachers who are 36-40 and 20-25 have a higher score in web pedagogical content knowledge. Another significant difference between preschool teachers' teaching experience and Web-Content Knowledge is obtained. There are similarities between the Web content Knowledge, attitudes towards web-based instructions and Web Pedagogical Content Knowledge scores and the teachers' age and teaching experience. Although the preschool teachers who have less than one year and the ones whose teaching experience is between 3-5 years are the same teachers whose age is between 20-25. The young people have the opportunity of getting information technologies courses at university which enables them to become competent not only in being technically but also in exploring knowledge on the Internet. In this case, age seems to be an important factor in using web. For Chou and Tsai (2002) web-based instruction yields new challenges for teachers. Cornell (1999) claims that it is normal to have concerns and feel anxiety about engaging in online teaching as it is the least experienced pedagogical practice. There must be something missing if teachers avoid using web technology to assist their teaching. Research done in the area suggests the potential of the Internet and Web technology to improve teaching (Barrbera, 2004; Mendler Mendler, Simon & Broome,2002; Wallace, 2004). Web based instruction is accepted widely by educators and researchers as it provides learners interactive, individual, inquiry-based activities. Moreover, it promotes the learners' knowledge construction and meaningful learning (Lee and Tsai, 2005). As there are various research on W-PCK with pre-service teachers, it is not possible to refer to any resource including the age group of in-service teachers. Korucu (2017) who investigated the perception of 96 teachers, he declared that he didn't find any correlation between the age and W-PCK level of teachers. Similarly, Yeşiltaş (2016) studied with social science teachers' perception levels of W-PCK but he didn't search on the correlation of age. Both researchers dealt with educational background of the teachers and likewise in this research, no correlation between the graduation and the W-PCK scores of the teachers was found.

Another finding is the correlation between Web pedagogical Content Knowledge and web general scores and computer and Internet access at home. Teachers who has the opportunity of technology at home have higher scores. According to the research done the use of internet and also social networks affect W-PCK levels of the users. Several studies show that the frequency of usage increases W-PCK level (Arabacıoğlu and Dursun, 2015, Akgün, 2013; Turan and Koç, 2016; Yazar and Şimşek, 2015; Gömleksiz and Erten, 2013). On the other hand, there is no correlation between W-PCK score and computer and Internet access at school is found. The possible reason is that teachers prefer reaching the educational contexts at home more than at school. There are quite rich resources such as songs, stories, nursery rhymes, games, arts and crafts demos etc. on the Internet for early childhood children. The preschool teachers surf on the sites in order to elaborate their teaching environment. The more they use the Internet, the more they become competent in W-PCK.

Conclusion and Suggestions

In this study it is aimed to investigate Web pedagogical content knowledge level of pre-school teachers. The results show that there is no correlation between their W-PCK scores and their graduation, having computer at school/work and having Internet access at school/work. On the other hand, a positive correlation between W-PCK scores of 60 preschool teachers and their age, teaching experience, having computer at home and having Internet access at home was found. Teachers who are in 36-40 and 20-25 age groups have higher Web pedagogical content knowledge scores than other age groups. Whenever the teaching experience of teachers is investigated teachers who have less than 1-year experience, 1-3 years and 3-5 years experience have higher scores in web content knowledge, attitude and Web pedagogical content knowledge. Lastly, teachers who have computer and Internet access at home have higher scores in Web pedagogical content knowledge and Web general.

In order to create effective teaching learning environments teachers are expected to be competent in using web. It is also one of the essentials of 21st century teacher qualifications. They need to be efficient in blending their pedagogical knowledge, content knowledge and web knowledge. In this way they can be more educative for their students.

In this age, Internet is a precious resource for in reaching information. With the development of information and communication technologies (ICT), education environments are reshaped by many teachers and caused them to prepare online lesson materials accessible by students from everywhere (Bağcı and Atar,2019). Moreover, it is possible to reach that unlimited information free of charge.

Several in service trainings can be prepared for teachers in order to improve their competency in using web sources. These trainings can possibly be online. Via these seminars, teachers can be easily and cheaply educated in the field of using web sources, blending pedagogical and content knowledge.

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