Journal of Teacher Education and Lifelong Learning (TELL)

Volume: 5 Issue:1 Year: 2023 ResearchArticle ISSN: 2687-5713

Pre-service English Language Teachers' 21st Century Skills: A Mixed-Methods Study on Digital Literacy*

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Article Info

Article History
Received: 21/12/2022
Accepted: 21/04/2023
Published: 30/06/2023

Keywords:
digital literacy,
pre-service teachers,
pre-service English teachers,
21st century skills.

ABSTRACT

Despite an increasing number of studies on pre-service teachers' digital literacy, there are few studies on pre-service English as a second/foreign language teachers. In the existing studies, there are issues especially regarding sample size, methodology, and analyzing different variables. Hence, this study recruits more participants from different institutions and investigates the effects of five variables, which are gender, grade, daily amount of time spent on digital platforms, the most used device, and year of digital platform use. The participants were 186 pre-service teachers from Türkiye. The quantitative data were collected via the Digital Literacy Scale and analyzed by Statistical Package for the Social Sciences (SPSS) 25.0 via independent samples t-test and one-way variance analysis. The qualitative data were collected via semi-structured interviews and analyzed by Descriptive Analysis. The findings showed that the participants had a medium to high level of digital literacy, while they reported higher levels in the interviews. The analysis of the survey indicated that the most used device and year of digital platform use had a significant effect on the participants' digital literacy levels. The interview results combined with the survey implied that the vital point in digital literacy training is to ensure "learning how to exploit digital skills" rather than gaining knowledge on all the available tools, applications, and resources.

Citation: Atar, C. & Bağcı, H. (2023). Pre-service English language teachers' 21st century skills: A mixed-methods study on digital literacy. *Journal of Teacher Education and Lifelong Learning*, *5*(1), 245-258.

*The initial analysis of this study was presented at *İNÖED 1st International Conference 21st Century Challenges in ELT* held between 27-29 May, 2021 in Ankara, TURKEY.

INTRODUCTION

Today, information and communication technologies are developing rapidly, and they affect each aspect of our lives. These effects occur thanks to the increase in the information we have. However, together with this massive increase in information, there is also an emerging problem of information pollution (McDougall et al., 2019). In today's world, there is access to information almost everywhere; however, checking the reliability of information and accessing the desired and relevant one requires a significant skill (Shenton, 2009). Hence, one of the significant 21st century skills is digital literacy (hereafter, DL). DL is a critical skill for pre-service teachers (hereafter, PTs). As for the definition of DL in this study, the definitions of DL as a set of decontextualized general digital skills are contested. Instead, the reconceptualization of DL from the perspective of the New Literacy Studies movement (Gee, 1990; Street, 1984) as a literacy practice located within a particular discourse with certain characteristics is followed (Campbell & Kapp, 2020).

The review of the literature suggests that there are few studies undertaken on pre-service English language teachers' (hereafter, P-ELTs) DL competence in the world (Alfarisyi, 2020; Anggeraini et al., 2019; Eryansyah et al., 2020; Liza & Andriyanti, 2020), and these studies were undertaken with a limited number of participants (Some are case studies, and even when it is a survey, the number of participants are around 50). This limits the generalizability of their results. In addition, none of the existing studies in the literature considered the effect of some potential variables and factors, nor did they utilize a mixed-methods approach except for Liza and Andriyanti (2020). What is more, there are few more studies that studied P-ELTs indirectly together with other PTs (Boyacı, 2019; Çam & Kıyıcı, 2017; Özoğlu & Kaya, 2020); however, as P-ELTs were only one group of the PTs in these studies, little specific information was provided about them. Moreover, the findings of the previous studies were partly contradictory. To summarize the issues in the literature, the studies in the literature have some limitations especially regarding sample size, methodology, and including different variables. Considering the significant gap in the literature in terms of the number of studies and the limitations in the methodology of the existing few studies, this study aims to fill in this gap by investigating P-ELTs' DL levels via a mixed-methods approach.

In a relevant study, Gilster (1997) stated that DL is a particular thinking style related to having perspectives beyond only pressing buttons. In addition, Gilster (1997) and Pool (1997) identified DL as the ability to understand and use the information presented by computers from different resources in various ways. DL, which is considered a measure while evaluating the quality of learning activities in digital environments, also supports a user-friendly approach (Eshet-Alkalai, 2004). The indication of having DL is an adaptation to new or developing technologies (Ng, 2012). Accordingly, DL not only includes an individual's learning of information and communication technologies efficiently, but it also underlines the use of these technologies in a secure, legal, and moral way to help an individual pursue personal development, solve problems in any context, and support social participation and production (Özerbaş&Kuralbayeva, 2018). DL consists of complex cognitive, sociological, and emotional skills that users need to work in digital environments efficiently. Reading the instructions on a graphic screen, creating meaningful materials in this environment, and assessing the quality and validity of the information on digital platforms are among the instances of DL (Karabacak & Sezgin, 2019). DL does not only enable users to find items or issues on digital platforms. At the same time, the users need to be able to use this information in their lives, transfer them to other areas of their lives and critically evaluate the obtained knowledge (Martin, 2008). In a nutshell, DL comprises the ability to use the platforms offered by today's information and technology age appropriately, detect the reliability of the information presented on these platforms, and also use digital technologies efficiently.

So, why is DL exactly necessary for PTs? Teacher training programmes face the difficulty of training PTs to use digital media critically. Recruiting informed and reflective PTs depends on pre-service teacher training (Santisteban et al., 2020). From the perspective of students, according to Prensky (2001),

natives, born after the 90s, identify themselves as immersed in technology and the digital world since birth. However, this does not ensure that they will readily use digital tools and technology in the classroom (Cortina-Pérez et al., 2014). PTs themselves should be able to use them first and whether they will use them in the future is variable (Fluck& Dowden, 2013). Considering that students from all grades use digital technologies frequently and the swift integration of the internet into our lives, education should systematically benefit from technology to increase efficiency via utilizing DL skills for pedagogic purposes. These kinds of technologies and platforms provide educational settings, and as a consequence, they let the users socialize and exchange information (Baker, 2000; Barile & Durso, 2002). They also let students learn better, and they can provide various implications for English language teaching (Paker & Doğan, 2021; Solmaz, 2020). Also, Karakoyun and Lindberg (2021) studied PTs from different fields in Türkiye and Finland, and they focused on 21st century skills. The study suggested that the PTs acknowledged the significance of DL skills for their future career and students. Considering the literature review above, it has been seen that there is a gap in the precise understanding of DL for pedagogical purposes. This is essential as using digital platforms for pedagogic purposes requires specialization.

Literature Review

In line with the recent changes, 21st century skills have been an essential part of our lives, and the role of teachers and PTs has also changed "from being an instructor to becoming a constructor, facilitator, coach, and creator of learning environments" (Amin, 2016, p. 41). To perform their novel roles per the current requirements, they must have DL (Eryansyah et al., 2020). When they themselves are digitally literate, it is only then they can lead and teach their students accordingly. This means that when PTs as future teachers have DL, they can teach more effectively and set an example for students regarding the utilization of 21st century skills.

Although some studies showed that PTs and especially P-ELTs have a moderate to high level of DL competence (Alfarisyi, 2020; Anggeraini et al., 2019; Boyacı, 2019; Çam & Kıyıcı, 2017; Eryansyah et al., 2020; Liza & Andriyanti, 2020; Özoğlu & Kaya, 2020), there are still studies which suggest that improving DL is essential for PTs (Akayoğlu et al., 2020; Campbell & Kapp, 2020). Hence, specific courses aiming to equip PTs with the necessary knowledge and skills regarding computer use, and thus digital literacy in general, should be reconsidered (Zehir-Topkaya, 2010). In the same vein, Liza and Andriyanti (2020) suggested that most English teachers and PTs were not prepared for integrating digital technologies into their lessons. In another study, Campbell (2016) found that PTs conflated DL with Internet Literacy. It was suggested that even if teachers had a medium or high level of DL, this was usually limited to technical skills and using digital tools (Dashtestani, 2014; Fitriah, 2017; Hedayati& Marandi, 2014; Liza & Andriyanti, 2020). They indeed had a superficial level of knowledge when it came to using digital technologies properly for pedagogical purposes.

As for the studies specifically undertaken on P-ELTs' DL competence, the literature review shows that there are very few studies throughout the world, and they are quite limited in terms of methodology (Alfarisyi, 2020; Anggeraini et al., 2019; Eryansyah et al., 2020; Liza & Andriyanti, 2020). Alfarisyi (2020) studied DL via a survey on 66 participants at a single university. So, it is a quantitative study, and it is slightly limited in terms of the number of participants and institutions (i.e., implemented in one single university). The results showed that the P-ELTs had a medium to high level of DL. Anggeraini et al. (2019) studied P-ELTs' views on DL and their DL level. They utilized a questionnaire, and this study also recruited a few participants from a single institution. Their findings suggested that P-ELTs had a medium level of DL. Eryansyah et al. (2020) investigated P-ELTs' DL level and factors in its development. The participants were the 4th graders at a single university, and thus there was no cross-sectional analysis. The data were collected via a survey. The results suggested that their level was above medium level. The final study is Liza and Andriyanti (2020), a mixed-methods study recruiting 54 participants. They found that the participants had a high level of DL.

To sum up the justification of this study considering the literature review, there are few studies undertaken on P-ELTs' DL competence (Alfarisyi, 2020; Anggeraini et al., 2019; Eryansyah et al., 2020; Liza &Andriyanti, 2020). As suggested above, the studies in the literature were undertaken with a limited number of participants (some are case studies, and even when it is a survey, the numbers are around 50-60), and they studied only one institution. This limits the generalizability of the results. Moreover, none of these studies considered the effect of some potential variables and factors, nor did they utilize a mixed-methods approach except for Liza and Andriyanti (2020). There are few more studies that studied P-ELTs' indirectly together with other PTs (Boyacı, 2019; Çam & Kıyıcı, 2017; Özoğlu & Kaya, 2020); however, as P-ELTs were only one group of the PTs in these studies, little specific information was provided about them. What is more, the findings of the previous studies were partly contradictory. While some claimed that P-ELTs had a medium level of DL (Anggeraini et al., 2019; Boyacı, 2019; Çam & Kıyıcı, 2017; Özoğlu & Kaya, 2020), other researchers suggested that they had a high level (Liza & Andriyanti, 2020). On the other hand, Alfarisyi (2020) and Eryansyah et al. (2020) found that it was medium to high. Accordingly, considering these gaps, this study was designed as a mixed-methods study specifically on P-ELTs, and 186 students from 3 different universities were recruited as participants to provide a more reliable and valid account of their views and DL level. Accordingly, considering the significance of 21st century skills, specifically DL, and the gap in literature, the following research questions were formed:

1. What is pre-service English language teachers' digital literacy level?
2. Does pre-service English language teachers' level change according to the variables gender, grade, mostly used devices, daily amount of time spent on digital platforms, and year of digital platform use?
3. How do pre-service English teachers view their digital literacy level and competence?

METHODOLOGY

Research Design

This study has a mixed-methods research design. The Digital Literacy Scale (Üstündağ et al., 2017) and a semi-structured interview were used to collect the data. The survey model can be used to investigate the variance between two or more variables or the level of variance, and the interview is a good way to obtain qualitative data (Karasar, 2005). The design of the study is summarized below.

Table 1.*The Methodology*

Research Questions	Data Collection Tools	Data Analysis
1) What is pre-service English language teachers' DL level?	The Digital Literacy Scale (Üstündağ et al., 2017)	The quantitative analysis of the DL scale via SPSS
2) Does their level change according to the variables gender, grade, mostly used devices, daily amount of time spent on digital platforms, and year of digital platform use?	The data collected via the personal information form and The Digital Literacy Scale (Üstündağ et al., 2017)	The analysis of the DL scale by SPSS with regard to the demographic variables through independent samples t-test and one-way variance analysis
3) How do the pre-service English teachers view their DL level and competence?	Semi-structured interviews	Qualitative analysis via Descriptive Analysis

The Context and Participants

The participants were P-ELTs 2019-2020 academic year. They were recruited via convenience sampling. The researchers sent the surveys to three universities with which they had a contact. 186 of them filled in the scale. Then, some participants were invited for interviews on a voluntary basis via e-

mail. In total, 26 volunteers were interviewed and audio-recorded. 13 of them were males, and 13 of them were females. The information about the 186 participants is presented below.

Table 2.*The Participants*

Variables		f	%
Gender	Female	123	66,1
	Male	63	33,9
Grade	1st grade	19	10,2
	2nd grade	68	36,6
	3rd grade	15	8,1
	4th grade	84	45,2
Mostly used digital platforms	Computers	41	22,0
	Smartphones	145	78,0
Daily amount of time spent on digital platforms	0-3 hours	44	23,7
	4-6 hours	81	43,5
	More than 6 hours	61	32,8
Year of digital platform use	Less than 6 years	21	11,3
	More than 6 years	165	88,7
Total		186	100

Data Collection Tool

To collect the quantitative data, a personal information form and the Digital Literacy Scale that was developed by Ng (2012) and adapted to Turkish by Üstündağ et al. (2017) were used. The scale consists of 10 items and a single factor. It utilizes a 5-point Likert type scale. So, the lowest point from this scale is 10, while the highest is 50. The Cronbach's Alpha internal consistency coefficient was calculated as 0.86 for the scale. The internal consistency was calculated as 0.824 after the implementation in this current study.

The qualitative data collection was undertaken via the semi-structured interview protocol that the researchers developed. There are six questions, which were developed after a thorough literature review. Then, they were sent for expert opinion. The experts approved them with minor changes such as adding a follow up clarification question. The questions were also checked for linguistic aspects by a language specialist to ensure validity and avoid any ambiguities. Finally, the analysis of the interviews were shared with two participants chosen on a convenience base (i.e., the ones from the researchers' university) to check whether the results were in line with their ideas. They confirmed that the analysis reflected their opinions.

The interview questions are below:

1) How do you assess your level considering current technologies you use?

2) When you encounter a problem with the technological platforms you use, can you solve the problems yourself? Could you provide some details?

3) Can you learn current technologies easily? Could you please explain how and why?

4) What do you think about your competence level in new technological learning environments such as presentation, digital stories or blogs? Could you please explain?

5) What are the methods and tools that you specifically use in the internet? Do you consider yourself competent in this aspect?

6) Can you find solutions to the problems (other than hardware issues) that you face while roaming? Could you please provide some details?

Data Analysis

SPSS 25.0 was used for analyzing the survey data. The significance level was set as 0.05, and whether the Digital Literacy Scale showed normal distribution was checked. Hence, the Kolmogorov-Smirnov test was applied, and the results confirmed that the data showed normal distribution at p>0,05. When p is smaller than 0.05, the data can be interpreted by checking skewness-kurtosis coefficients (Büyüköztürk, 2007; Büyüköztürk et al., 2019). Accordingly, the Digital Literacy Scale points were checked for skewness and kurtosis via the Kolmogorov – Smirnov test. The results were presented in below.

Table 3.*Kurtosis and Skewness Values*

	K-S	p	Skewness	Kurtosis
Digital Literacy Levels	,073	,017	-.181	.248

When the Kurtosis and Skewness values are between -1.5 and +1.5, it is considered normal distribution (Tabachinick & Fidell, 2013). Therefore, the data of this study showed normal distribution. The variances according to the Levene's test results were ($F = 1.267$, $p > .05$) for participants' gender, ($F = .616$, $p > .05$) for grade, ($F = .873$, $p > .05$) for mostly used digital platforms, ($F = .659$, $p > .05$) for daily amount of time spent on digital platforms, and ($F = 4.848$, $p < .05$) for year of digital platform use. These results prove that the groups show equal variances. Hence, further SPSS analysis on the data is reliable. Accordingly, when the variables with two subgroups (i.e., gender, mostly used digital platforms, and year of digital platform use) were analyzed, independent samples t-test was applied, and with the variables that had more than two subgroups (i.e., grade and daily amount of time spent on digital platforms), one-way variance analysis was utilized.

The interview data were collected from 26 participants that were invited via e-mail and volunteered to take part in the study. The data were analyzed by Descriptive Analysis. Each of the six questions in the interview was analyzed one by one. In Descriptive Analysis, the data is analyzed according to some pre-defined themes (i.e., digital literacy), and the results are presented according to the research questions. Direct quotations from the participants are also used while presenting the findings. In this way, the findings are provided in a systematic way with direct evidence from the data (Yıldırım & Şimşek, 2008).

Ethics

This study has ethical approval from Sakarya University under the protocol number 61923333/050.99/ on 09/11/2020.

FINDINGS

The analysis of the scale

Considering the research questions, the analysis of P-ELTs' DL level and its investigation according to the variables were presented below. These answered the initial two research questions. After the scale results, the analysis of semi-structured interviews was presented, which answered the third research question. The results of P-ELTs' digital literacy level are presented below.

Table 4. The Descriptive Results of Digital Literacy Levels

	$\overline{X}$	sd
Digital Literacy	3.77	.55

The analysis showed that P-ELTs had an average of 3.77 from the DL scale. This result suggests that their level is above the medium level. In other words, the P-ELTs in this study may be considered qualified at a medium to high level in terms of their DL level and abilities.

The results of independent samples t-test analysis that was undertaken to check whether the first variable, gender, affected the participants' DL level are presented below.

Table 5.*Participants' Digital Literacy Levels according to Gender*

	Groups	n	$\overline{X}$	Sd	df	t	p
Digital Literacy	Female	123	3,73	,57	184	-1,394	.164
	Male	63	3,85	,52			

According to Table 5, while the males had an average of 3,85, the females had 3,73. There was a slight quantitative difference in favor of males; however, the results did not show any significant difference considering gender [t(184) = -1.394, p>.05]. So, it can be stated that gender as a variable did not significantly affect the participants' DL level.

The results of the one-way Anova test that were obtained from the analysis of the participants' DL level concerning grade are presented below in Table 6.

Table 6.*Participants' Digital Literacy Levels according to grade*

	Groups	N	X	Sd	df	F	p	Significant difference
Digital Literacy	1st grade	19	3,63	,48	3	,947	,419	No
	2nd grade	68	3,73	,56	182			
	3rd grade	15	3,83	,50	185			
	4th grade	84	3,83	,58				

The analysis showed a slight increase from the 1st grade (3,63) to the 4th grade (3,83) cross-sectionally. However, this was not a significant difference (p<,419). This means that grade did not have a significant effect on the participants' DL levels [F(3-182) =.947, p>.05]. In other words, although participants' average was higher in the following grades (e.g., 3,63 in the 1st grade while 3,83 in the 4th grade), this difference was not found to have significance.

The following variable was the digital platforms the participants used the most. The results of the independent samples t-test undertaken to investigate whether the platform used by the participants affected their DL level are presented in Table 7 below.

Table 7.*Participants' Digital Literacy Levels according to the mostly used devices*

	Groups	n	$\overline{X}$	Sd	df	t	p
Digital Literacy	Computers	41	4,02	,56	184	3,342	.001
	Smartphones	145	3,70	,53			

According to Table 7, there was a significant relationship [t(184) = 3.342, p<.05] between the device P-ELTs used and their DL levels. The results suggested that the participants using computers had a higher DL (= 4,02) than those using smartphones (= 3,70), and more importantly, this was a significant difference. Consequently, it may be suggested here that the mostly used devices had a significant effect on participants' DL levels in favor of computers.

The results of the Anova one-way variance analysis undertaken to investigate whether PELTs' DL significantly differs according to the daily amount of time spent on digital platforms were presented in Table 8 below.

Table 8.*Participants' Digital Literacy Levels according tothe daily amount of time spent on digital platforms*

	Groups	N	X	Sd	df	F	p	Significant difference
Digital Literacy	0-3 hours	44	3,72	,54	2	1,930	,148	No
	4-6 hours	81	3,72	,57	183			
	More than 6 hours	61	3,89	,54	185			

The results showed that there was not a significant difference [F(3-182) =1.930, p>.05] in P-ELTs' DL levels with regard to the daily amount of time spent on digital platforms. This means that the daily amount of exposure to digital platforms does not have a significant effect on the participants' DL levels.

Although a slight increase was observed as the time spent on digital platforms increased (e.g., 3,72 in 0-3 hours while 3,89 in more than 6 hours), the analysis did not suggest any statistically significant differences among groups.

The results of the analysis that was undertaken to check whether year of digital platform use affected the participants' DL level are presented below.

Table 9.*Participants' Digital Literacy Levels according to year of digital platform use*

	Groups	n	Median	Rank Sum	U	p
Digital Literacy	Less than 6 years	21	59,07	1240,50	1009,500	.002
	More than 6 years	165	97,88	16150,50		

According to Table 9, P-ELTs' DL was significantly [t(184) = -3.965, p<.05] affected by year of digital platform use. Those using digital platforms for more than 6 years had an average of (= 3,83), while those who used them less than 6 years had (= 3,34).When the medians are considered, it is also observed that the participants that used digital platforms more than 6 years had higher digital literacy levels than those that used them for less than 6 years. Then, the analysis demonstrated that P-ELTs who used digital platforms more had higher DL levels.

The Analysis of the interviews

As for the results of the semi-structured interviews, the results will be provided one by one for each question in the interview.

The first question was, "How do you assess your level considering current technologies you use?" The analysis of the responses showed that most of the participants thought that they could solve the problems they encountered on technological and digital platforms. Six of the participants said they were very good, and 13 said they were good at current technologies. On the other hand, 5 of them said they had a medium level of skills while 2 said they were bad at solving problems about technologies.

The second question was, "When you encounter a problem with the technological platforms you use, can you solve the problems yourself? Could you provide some details?" The analysis showed that they mostly said "yes". To exemplify, P24 said: "Yes. I use search engines and specialist websites". Only 1 person said "sometimes", and 2 of them said they had difficulties. This showed that most of the participants thought they could solve the problems they had on technological platforms. Those who said "yes" explained that they solved the problems mostly by the internet via search engines, videos, and forums. Most of them also suggested that experts, friends, and acquaintances also helped them. Sometimes, they also used technical support and checked instructions, and they benefitted from English. Those who said no also reported similar solutions such as forums, videos, and acquaintances /experts. However, in the failure cases, the problem stemmed from the cases where it was too technical or mathematical and when they were afraid to break it down.

The third question was, "Can you learn current technologies easily? Could you please explain how and why?". This question focuses on the learning of new technologies, which is essential as this indicates their life-long learning and self-updating skills. Twenty-two of them said that they could learn them easily while 4 said no or at medium level. This suggests that most P-ELTs thought that they could learn new technologies easily. The most common ways were long exposure to technology (e.g., being born into technology) mentioned by 8 and interest mentioned by 6 participants. A few of them mentioned trial and error (3 people), the use of technology by family members as well (2 people), and forums (e.g., expert websites and tech websites mentioned by 2).

As for those who said no, they mentioned interest as one factor. They said they were not interested in technology. P22 said: "It is not interesting for me. I only learn the necessary ones". A few P-ELTs complained that new technologies kept emerging, and each device had its own programs and rules. They also suggested that they were exposed to it late, afraid to break it down, and they did not have much time

and interest.

The fourth question was, "What do you think about your competence level in new technological learning environments such as presentation, digital stories, or blogs? Could you please explain?". Most participants said that they could use these kinds of environments. As an explanation, P12 stated, "We have been educated regarding this, and we always use them." On the other hand, 3 participants said they had a medium level in these environments. None of the participants reported having serious problems considering the use of learning environments. Some of the ones who said they had a medium level mentioned that they sometimes had problems when there were environments that required special knowledge, such as some features of Microsoft Excel or creating a blog.

The fifth question was, "What are the methods and tools that you specifically use in the internet? Do you consider yourself competent in this aspect?". In response to this question, almost all the participants said they felt competent in this aspect. As for the methods and tools, search engines (almost always Google) were mentioned the most frequently (24 participants), and specialist/popular web pages (often Google scholar, databases, forums, and specialist websites) were mentioned by 11 as they were considered reliable. 2 participants stated that they cross-checked other web sites instead of single sources. 3 mentioned online libraries, another 3 mentioned social media, and 1 mentioned expert people. To exemplify a typical response, P12 said: "Yes. I use search engines and specialist web pages such as ScienceDirect."

The final question was, "Can you find solutions to the problems (other than hardware issues) that you face while roaming? Could you please provide some details?". Again, almost all the participants stated that they could solve these kinds of problems. Only 1 person said it was at a medium level, and another participant stated there were problems. Hence, 3 participants mentioned having some problems regarding this point. They explained this by referring to the fact that they were born before or in the middle of the technology age. Hence, they believed that they needed to equip themselves more as future teachers. On the other hand, P25 argued that although he was not born into the digital age, he could use digital technologies.

DISCUSSION

In line with the research questions, the analysis of the data was summarized in Table 10:

Table 10: *Overall results of the analysis concerning the research questions*

Research Questions	Results
1) What is P-ELTs' DL level?	P-ELTs have a DL of a medium to high level.
2) Does their level change according to the variables gender, grade, mostly used devices, daily amount of time spent on digital platforms, and year of digital platform use?	Two variables, the mostly used devices and year of digital platform use, have a significant effect on P-ELTs' DL level. On the other hand, gender, grade, and the daily amount of time spent on digital platforms do not have any significant effects.
3) How do the pre-service English teachers view their DL level and competence?	Most P-ELTs think that they have a high digital competence. They mostly considered themselves competent at solving digital problems, benefitting from technology for pedagogical purposes, and learning new technologies. These indicate that they consider themselves competent in digital skills.

The findings then showed that the participants had a medium to high level of DL, and the mostly used devices (i.e., in favor of computers compared to smartphones) and year of digital platform use (i.e., in favor of more than 6 years in contrast to less than 6 years) had a significant effect. The interview results also supported the findings from the scale regarding the 1st research question. When the survey and interview results were compared, it may be suggested that they were in line with each other in that the P-ELTs were found to have a medium or higher DL level (in questionnaire results), and they also expressed

this in the interview. This is in line with similar studies that focus on other aspects such as technological pedagogical content knowledge (e.g., Sarıçoban et al., 2019), and it has implications for PT training (Santisteban et al., 2020).

On the other hand, in the interviews, it was seen that the participants reported a higher level of DL, as obvious from the fact that they thought they could use technology and digital devices for daily issues as well as pedagogical issues. What is more, they suggested that they could solve the problems they faced on the internet via various tools and methods. When a comparison with the literature is made, the findings regarding P-ELTs' DL levels are in line with most of the literature, which found that P-ELTs had a medium to high level (Alfarisyi, 2020; Eryansyah et al., 2020; Liza &Andriyanti, 2020). On the other hand, some studies argued that they had a medium level (Anggeraini et al., 2019; Boyacı 2019; Çam & Kıyıcı, 2017; Özoğlu & Kaya, 2020, p. 415). These results do not seem to contradict each other in that they agreed that P-ELTs had at least a medium level. One thing to note is that the studies which found a medium level of DL are slightly older than the ones that found a medium to high level, including our study. This slight year gap may explain this difference as newer generations of P-ELTs possibly become more and more digital natives as the years pass (Prensky, 2001).

The five variables analyzed in this study suggested that only the mostly used device (i.e., computers) and year of digital platform use (i.e., 6 or more years) had a positive effect on P-ELTs' DL levels. This finding is precious as the previous studies did not investigate the effects of variables much. The digital platform seems to contribute to DL levels positively; however, it is difficult to detect whether it is the cause or the effect. As they included more properties and features, having computers may enable the participants to do more things on digital platforms in comparison to mobile devices, and this may lead to a higher DL level. On the other hand, the participants with a high level of awareness of DL may prefer to choose computers as they believe that they may do more thanks to them, which makes using computers an effect rather than a cause. As for year of digital platform use, it may be suggested that this is an expected finding in that more exposure to digital platforms will probably lead to more competence. A comparison with the literature cannot be made as there are no studies focusing on the effects of factors on DL, as mentioned in the justification of our study. Still, it can be suggested here that information and communication technologies offer contributions into pre-service teacher training. As the current study has shown, the participants already have a medium to high level of competence. Hence, teacher training programs may focus on improving further skills and developing ways to benefit from information and communication technologies more for pedagogic purposes (Cortina-Pérez, 2014).

As for more detailed issues, the second interview question specifically focused on problem-solving on technological platforms, which is an essential part of DL. The findings showed that most of the participants thought that they could solve these problems. As the responses showed, this was probably thanks to the help of experts and acquaintances. Although most participants said that they asked for help frequently, it may still be argued that they knew how to solve or find a way to solve digital problems. So, they could solve digital problems ultimately. The few participants who said they could not solve the problems suggested that they had difficulties when the problems were too technical or mathematical and when they were afraid to break it down. This is quite understandable and, in fact, normal as laypeople cannot be expected to be good at mathematical or too technical issues. This was also mentioned in the next question, in which the results showed that no participants reported having significant troubles in learning environments except for the cases which required technical information and knowledge. Thus, the analysis of the answers to this question also suggested that the participants overall had a medium to high level of DL.

The fourth interview question investigated the use of learning environments, which is essential for the P-ELTs as future teachers in the digital era. The findings demonstrated that none of them reported any severe problems considering the use of learning environments. They explained that they had been trained on using them and used them all the time. This means that the participants seemed to be quite

confident in the pedagogical use of technology. This is an essential finding in that P-ELTs felt comfortable with using technology for teaching purposes. Eryanshah et al. (2020) also had a similar observation regarding this. They suggested that there was a negative link between lack of training on DL skills and DL level. So, this showed that training the digital natives is essential, and it is in line with Ng's (2012) findings. The other question analyzed the methods and tools used on the internet. Search engines were mentioned as the most frequent one, Google hugely dominating the others. This is in line with some other studies (e.g., Atar & Bağcı, 2020). Also, they stated that they referred to specialist and expert web pages such as forums and Google scholar, and they sometimes cross-checked the information from different web pages. This is related to the information searching aspect of DL as they paid attention to reliability (Atar & Bağcı, 2020).

One interesting finding is that although most of the P-ELTs thought they were good at technology, they sometimes reported solving their problems with the help of specialist web pages, search engines, and experts. Hence, they occasionally asked for help from others, as in the case of experts or maybe forums. This may indicate that knowing how to solve digital issues is also significant in addition to being knowledgeable in digital technologies. It may be argued here that knowing how to access data and tools may be more important than having the information in your mind as our minds are limited. However, the internet and technology provide immense opportunities as digital skills enable people to function successfully without having to learn and understand many technical issues. So, it may be suggested that the focus of education should be on teaching students how to access and use reliable sources via DL, and maybe we may argue that the vital point is ensuring learning how to exploit digital skills, rather than learning and knowing all the tools, applications and resources.

A theme raised several times by the interviewees was digital nativeness (Prensky, 2001). This was observed in the interview data occasionally, especially in the 3rd and 6th questions. The analysis of the interview supported the existence and conceptualization of this idea among the participants. When they tried to explain why they considered themselves competent in DL, they referred to their being born into technology. According to the analysis, this was possible via long exposure to technology and the familiarity of the family with digital platforms as well. This finding confirms the suggestions in the literature regarding the characteristics of digital natives. The participants believed that they were born into technology, and this was simply how they could use and learn technology at ease. Hence, the analysis showed that most P-ELTs thought that they could acquire new skills easily as supported by the results of the 3rd interview question as well. This is significant as this indicates their life-long learning and self-updating skills, too. Still, intervention studies that focus on improving teachers' and pre-service teachers' digital skills may be more benefical (Fluck& Dowden, 2013), and this area indeed needs further studies. As Karakoyun and Lindberg (2021) suggested, defining pre-service teachers' DL level is significant to further improve their skills.

Conclusion

This study set out to fill a gap in the literature regarding P-ELTs' DL levels and their views. The previous studies in the literature were restricted in terms of generalizability as they tended to focus on few participants and usually one institution. Also, the previous studies reported conflicting results considering P-ELTs' DL levels, and they usually depended upon either a quantitative or qualitative design without taking variables into account. Accordingly, this study analyzed P-ELTs' DL levels and their views regarding their competence via a mixed-methods study that analyzed data from 186 participants from 3 institutions. The analysis also investigated the effects of some potential variables. The findings suggested that P-ELTs had a medium to high level of DL. As for the interview results, it was found that most P-ELTs thought they had a high DL level. They mostly considered themselves competent at solving digital problems, benefitting from technology for pedagogical purposes, and learning new technologies. This indicated that they considered themselves competent in digital skills. Two variables, the mostly used devices and year of digital platform use, were observed to have a significant effect on P-ELTs' DL level.

On the other hand, gender, grade, and the daily amount of time spent on digital platforms did not have any statistically significant effects.

This study also showed that the participants were aware of their digital native status explicitly, although it was not asked to them. In this sense, from a social identity perspective, they considered themselves as digitally literate individuals that can function easily in the new digital world. On the other hand, a few of the participants who said they had some problems solving internet problems suggested that this was so because they were born before or in the middle of the digital world. Then, it may be argued here that the concept of digital natives manifests itself firmly in the discourse they used to assess and position their DL. So, building upon their confidence in digital literacies, the goal of PT education programs should be aligned with teaching PTs how to exploit digital resources rather than teaching them digital tools. Finally, as this study showed that learning how to exploit digital skills is more important than the level of competence itself, more systematic interventions were suggested for future studies. To exemplify, boosting self-regulated learning strategies may enable individuals to improve their DL in a sustainable way.

Despite its contribution to a significant gap in the literature, this study naturally has some limitations. Although this study included more participants and different institutions in its sample compared to the previous studies, still the sample is restricted to a single country. Hence, studies including participants from different countries can sketch P-ELTs' DL levels around the globe. Another significant point is that this study demonstrated that, in general, P-ELTs felt secure about their DL levels and competence. Accordingly, future studies might identify P-ELTs' specific needs and focus on improving them directly as they seem to have an established competence already. The output of Digital Competence Framework for Educators (DigCompEdu) may be utilized for this goal, and intervention studies that aim to improve PTs' DL skills are needed. To exemplify, Pérez-Escoda et al. (2019) is an extensive study on the development of DL. Finally, this study utilized a cross-sectional design; however, future studies may be designed as a longitudinal one and track the same individuals' progress over time.

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