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INFORMATION TECHNOLOGY (IT) TEACHER CANDIDATES' ATTITUDES TOWARDS AND OPINIONS ON ONLINE TESTING DURING COVID-19 PANDEMIC

Research article

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Abstract

This study aims to determine the attitudes and opinions of pre-service IT teacher candidates regarding online testing at the first period of the COVID-19 pandemic. This research is a descriptive study with explanatory sequential mixed method design. The study sample consisted of 69 teacher candidates enrolled in 3 different courses lectured by the researcher at the Computer Education and Instructional Technologies Department, in the spring semester of 2019-2020 academic year. The data were collected through the Online Examination Assessment Scale and an interview form developed by researcher. In quantitative data analysis, frequency, percentage, and average, independent sample t-test, and one-way ANOVA were applied as well as descriptive statistics. The content analysis method was used to analyze the qualitative data obtained from the survey. The findings suggest that (1) teacher candidates' attitude scores were above average; (2) their attitudes towards online testing differed significantly depending on gender, age, course, and computer self-efficacy levels; and (3) the participants who had taken online tests before had a more positive attitude towards online testing, but this difference was not significant. Besides, according to teacher candidates' opinions towards online testing, the most important advantage of this type of testing was that they felt independent and comfortable due to taking the test in the home environment and without a proctor. On the other hand, possible technical problems during the test were one of the frequently mentioned issues in the student views regarding online testing.

Keywords: IT teacher, covid-19, online test, attitude, perceptions

1. Introduction

The epidemic has quickly started to show its effects in the field of education, as it affects people in every field of daily life. All countries have proceeded differently in terms of education during the COVID-19 pandemic. Although at the early phase of the COVID-19 outbreak, many countries first chose the options such as daily cleaning, reducing the number of students, designing classrooms suitable for social distance, promoting online education, suspending education for a particular time, and ultimately decided to cease educational activities (Souisa & Salim 2020).

Following the closure of schools, all educational activities in the world have been carried out through distance education. However, it was observed that universities were not prepared and equipped enough for distance education (Bozkurt & Sharma 2020). Since recent distance education programs have not been delivered systematically and only have offered temporary solutions to maintain education services during the pandemic, they do not involve essential conceptual prerequisites and meaning of distance education. According to Coeckelbergh (2020), the misconceptualized and incorrect use of specific procedures and practices related to distance education during the pandemic might negatively affect the future. Therefore, the method of distance education in a crisis can be defined as "emergency remote education" (Hodges, Moore, Lockee, Trust & Bond 2020, Çalık & Altay, 2021). Bozkurt et al. (2020)

chose the term "emergency remote education" as it is not an option but a requirement. Such a requirement has led to severe discussions on the differences between online and face-to-face education in Turkey. However, as mentioned above, the discussion was not about the delivery and quality of education but about the concept of distance education, which was not structured correctly during emergency remote teaching/education. As Weller underlined (2020), another critical point was the excessive emphasis on technology-oriented solutions. Although the use of technology in education is not a recent issue (Baron, 2017; Rushby 2013), those attempts only involve synchronous-asynchronous (Henriksen, Creely & Henderson 2020) ways like using only computers, smartphones, and tablets or involve synchronous content presentation with online tools (Lowenthal, Borup, West & Archambault 2020). For example, Wiederhold (2020) indicated a symptom, "Zoom fatigue," among the students using Zoom application that led to adverse outcomes among students in both physical and cognitive terms.

In addition to the issues surrounding the education types during the pandemic, the most significant problems were also observed in the assessment and evaluation processes (Bozkurt 2020). Although several universities in different countries suspended the evaluation process based on pass/fail, almost all universities in Turkey administered online tests (Bozkurt 2020). Although there are various findings of the effects of the testing mode on students' performance (Nikou & Economides 2019), the online tests were administered without validity and reliability studies (d'Orville 2020). Online tests have become increasingly inevitable due to the development of technology, and it has been observed that the problem is not the use of online tests but the way of administration. In this sense, the advantages of online testing such as instant feedback, interaction, rich interface resources, side-shifting, and the use of different question types, multimedia, and graphics (Marriott and Teoh 2019) were ignored, and paper-pencil test items were converted to online testing items. It is another critical problem related to assessment and evaluation during the pandemic. Another finding regarding the assessment methods is the students' lack of experience in online testing systems and the lecturers' challenges in figuring out the balance between exam safety and students' technological competence (Clark et al. 2020).

As the central point of teaching and learning, assessment is the process of evaluating learners' knowledge, understanding, capability or skill, and mostly represents summative exams to determine and describe students' achievement. Today, innovations and advances in information and communication technologies make computer-based assessment more efficient, innovative and evolutionary in terms of evaluating students' performance compared to traditional assessment (Jasil et al. 2020; Başaran et al. 2017). An electronic assessment refers to benefit from an electronic system (computers) in the assessment and testing. In this sense, if a computer, tablet, phone or similar devices are used with the local network or the internet in the delivery of the questions to students, storing the answers, giving immediate feedback, and reporting, it is accepted as an online test (Dembitzer, Zelikovitz & Kettler 2018).

Online testing, as a sub form of computer-based assessment, can provide various advantages to the assessment process in order to improve student learning. These can be listed as speeding up the evaluation process (Yılmaz 2016), providing fast and improved feedback (Bloom at al., 2018), enabling the use of different resources (Pawasauskas et al. 2014), reducing potential cheating (Retnawati 2015), and finally keeping records of students' assessment faster and more conveniently (Retnawati 2015). The studies in the literature are mainly qualitative and quantitative studies analyzing the effects of online testing on different variables that determine students' attitudes and opinions about online assessment. In a qualitative study by Pino-Silva (2008), students were asked about their attitudes towards computer-based testing, and it was found that they were generally positive due to specific characteristics of the online testing such as the immediate announcement of test results, instant feedback, and correct scoring. Many

studies involving different fields and samples also reached similar results (Kuo & Wu 2013; Gürsoy 2016; Da'asin 2016; Alsadoon 2017; Jasil et al. 2020).

When the online evaluation is analyzed by gender, age, test anxiety, or computer anxiety, a general consistency is seen in the quantitative studies in the literature. For example, when the attitudes of the students are analyzed by gender, it was found that the attitude scores of male students were higher than females in almost all of the studies, but the differences were not statistically significant (Bennet 2015; Basol & Balgamis 2016; Başaran et al. 2017). Similarly, it was revealed that attitudes positively changed as age increased, but the differences were not statistically significant (Lee et al. 2012; Başaran et al. 2017). According to Bennet (2015), the effect of age is directly related to computer self-efficacy. Besides, it was observed that as the computer self-efficacy of upper-class students increased, their positive attitudes towards online testing increased. It was concluded that test anxiety and computer anxiety played an essential role in determining the attitudes towards online testing. The other studies showed that students' fear and self-esteem levels about computer use determined their attitudes towards online testing (Terzis and Economides 2011; Balogun and Olanrewaju 2016; Lu et al. 2016).

In light of the studies mentioned above, there are different factors affecting students' attitudes towards online testing such as age, gender, test or computer anxiety. This research was conducted to describe opinions of IT teacher candidates regarding online testing during Covid-19 pandemic and define the factors affecting their use of online testing. Moreover, additional analysis was conducted in order to understand pre-service teachers' attitudes towards online testing according to different variables, such as gender, age, courses they enrolled for, pre-experiences in online tests, and computer self-efficacy level. In order to achieve these objectives, following research questions is identified.

1. Is there any difference in pre-service teachers' attitudes towards online tests according to their gender, age, class level, registered course, previous experience in online testing, and computer self-efficacy level?
2. What are their opinions about the use online testing as an evaluation method during covid-19 pandemic?

2. Method

2.1. Research model

This research is a descriptive study based on mixed method approach in which quantitative and qualitative methods are used together. This method is often used to access more detailed findings and comments for the research questions than a single method cannot answer alone (Fırat et al. 2014). Also, according to Creswell (2009), this method is an ideal approach since the research can reach both quantitative and qualitative data. There are different types of mixed method research designs in the literature (Creswell 2009). In this study, an exploratory sequential mixed method design, in which quantitative data is dominant, is used.

2.2. Study Sample

The study sample consisted of 69 teacher candidates studying at the Computer Education and Instructional Technology Department of Dokuz Eylul University during the spring semester of 2019-2020 academic year. The participant teacher candidates enrolled in 3 different courses lectured by the researcher. Students were of different age and class level groups (Table 1). The purposeful sampling method was chosen due to its convenience and students' registration to the online exam system. Table 1 below shows the demographic information related to the study sample.

Table 1. *Demographic information of the study sample*

		n	%
Registered course	Programming languages	25	36
	Web-based programming	28	41
	Algorithm design and development	16	23
Age	Group 1 (18-19-20)	12	17
	Group 2 (21-22-23)	46	67
	Group 3 (24-25-26)	11	16
Gender	Female	24	35
	Male	45	65
Pre-experiences in online test	Yes	39	56.5
	No	30	43.5
Computer self-efficacy level	Level 1 (1-3)	0	0
	Level 2 (4-6)	15	22
	Level 3 (7-9)	54	78
Internet	Available	67	98
Desktop or laptop	Available	68	99

2.3. Data collection tools

An online survey created with Google Forms was used as a data collection tool. The survey consists of three sections. There are six items in the first section, including demographic information such as gender and the registered course, and three items to determine students' digital competencies. In the second section of the survey, there are two open-ended questions regarding the participant's general experiences of online testing. In the last section, the "Online Examination Assessment Scale" developed by Yılmaz (2016) was used. Apart from the survey, online face-to-face interviews were conducted through the collaboration tool of the learning management system, with pre-service teachers to determine their online test experience. Detailed information about the data collection instruments is given below.

2.3.1. Demographic information

There are six questions for students' demographic properties: gender, the enrolled course, age, the device used for the exam, pre-experiences in an online test, and computer self-efficacy level. Besides, this section involves items to determine students' digital competencies regarding online exams. For example, the questions are about the availability of internet services, a desktop, laptop, or smartphone at home or their surroundings, and their preferences about online testing after the Covid-19 outbreak.

2.3.2. Interview Form

The semi-structured interview form, which constitutes the qualitative data of the study, was developed by the researcher. The questions were prepared after a literature review and expert opinions. The interview form, which was initially designed as 10 questions, was reduced to 5 questions as a result of the validity and reliability studies of the data. Under each question, the probing questions are included. Before the interview, the participants were informed and the necessary permissions were obtained for audio-recording. Participants were also informed that they could leave the interview at any time without giving a reason. Some of the questions of used in the interview form are as follows:

- Do you think online testing is difficult?
- What is the most challenging situation that you experienced during the test?

- Do you prefer online test in School after Covid-19?
- What are the advantages of online test?
- What are the disadvantages of online test?

2.3.3. Online Examination Assessment Scale

A 5-point Likert type scale with 17 items developed by Yılmaz (2016) was used to describe teacher candidates' attitudes towards online testing. The options on the scale for each item are scored as follows: 1 = Strongly disagree, 2 = Disagree, 3 = Partially agree (50% 50%), 4 = Agree, 5 = Strongly agree. The instrument also consists of three factors: (1) Practicality and suitability (8 items), (2) Affective factor (6 items), and (3) Reliability (3 items). Cronbach's Alpha values are 0.87 for the whole scale, 0.88 for the first factor, 0.82 for the second factor, and 0.81 for the third factor, respectively. The Cronbach's alpha values for the current study was found 0.93 for the first factor, 0.87 for the second factor, and 0.78 for the third factor.

2.4. Process

An online testing system developed by the researcher in 2016, was used for this study. The system was not developed specifically for this study, but has been actively used by the researcher since then. The system is constantly updated, taking into account the needs of students and faculty members. This testing system prioritizes feedback, data security and user experience, offers an easy and straightforward interface, is compatible with both desktop and mobile devices, and supports different question types. For this study, students who enrolled in Programming Languages II, Computer Authoring Languages and Algorithm Design and Development courses were registered to this system and were asked to take their tests by smartphone or computer.

Before the midterm exams were executed through the system, all participants were informed about the research and online assessment system. It was initially planned to operate the system in both midterm and final exams in the 2019-2020 spring term, but the university senate decided to set homework or a project instead of final exams (Dokuz Eylül University, May 2020). Thus, the students used the system only for the midterm exam. They registered the system with a username and password, then completed the exam via a computer, smartphone or tablet at home and within a specific time.

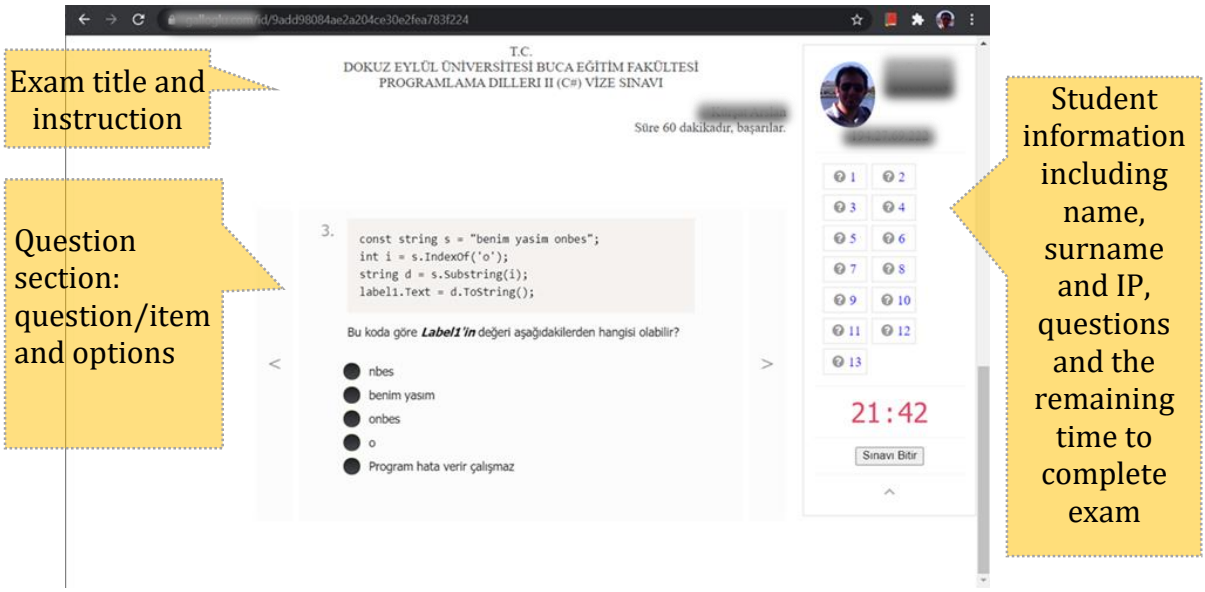

Figure 1. The screenshot of the online testing system

For each online test, there were at least ten multiple-choice questions, three true/false questions, one fill in the blank, and one open-ended question. The questions appeared in a different order for every student, and only one question was shown on the exam screen. The screenshot of the exam is presented in Figure 1. Also, the duration of each test was minimum of 20 minutes. When it is over, the system automatically logs off. If permitted by the tester, the student can see the results immediately with the necessary feedback.

On completion of the test, the students were invited to complete the online survey, which was available until the end of the day. On the first page of the survey, the research's purpose and process were explained, and the students were asked to fill out the declaration of voluntary participation. Besides, they were informed that they could withdraw from the survey at any time and without showing any justification. Also, by sending a mail to the researcher, they can request their data not be used even if they complete the survey.

2.4. Data analysis

The scale data used in collecting quantitative data were first uploaded to the SPSS program, and necessary revisions were made (recoding of the data and categorization of some variables). The data were analyzed with the SPSS 25 program. In addition to descriptive statistics such as frequency, percentage, and average in quantitative data analysis, interpretive statistics such as independent sample t-test, and one-way ANOVA were applied. Before the interpretive analysis, necessary assumptions for the parametric tests were checked and no serious violation was found. The significance level was set at 0.05. The qualitative data obtained from the surveys and interviews were analyzed with the content analysis method, which involved four stages: coding the data, finding or creating the themes, updating the codes and themes, and findings and interpretations.

3. Findings

3.1. Findings based on the quantitative data

Scale and factor scores of teacher candidates' opinions about online assessment are summarized in Table 2.

Table 2. *Scale and factor averages*

Scale and Sub-factors	N	$\bar{X}$	SD
Scale	69	3.55	.38
F1: Practicality and suitability	69	3.50	.87
F2: Affective factor	69	3.41	.91
F3: Reliability	69	3.80	.73

The averages of the scale and sub-factors based on teacher candidates' answers are presented in the table above. Accordingly, it can be said that teacher candidates' attitudes towards online assessment in the COVID-19 pandemic were above the midpoint of the scale (X = 3.55). When the findings were checked among the sub-factors, the highest mean was in the reliability sub-dimension (X = 3.80). Following the reliability sub-dimension, practicality and suitability sub-dimension values were also above the midpoint (X = 3.50). On the other hand, the lowest average was seen in the affective factor (X = 3.41). Thus, it can be inferred that although the participant teacher candidates found the online testing mostly practical, useful, and reliable, they were partially anxious and distressed. The findings of teacher candidates' attitudes towards online assessment by gender are shown in Table 3.

Table 3. *Independent sample t-test results by gender*

Scale and Sub-factors	Gender	N	X̄	SD	df	t	P
Scale	Female	24	3.18	.71	67	-3.24	**0.00***
	Male	45	3.74	.65			
F1: Practicality and suitability	Female	24	3.15	.93	67	-2.49	**0.01***
	Male	45	3.68	.79			
F2: Affective factor	Female	24	3.02	.97	67	-3.25	**0.00***
	Male	45	3.72	.78			
F3: Reliability	Female	24	3.59	.91	67	-1.72	0.08
	Male	45	3.91	.59			

* P<0.05

As can be seen in Table 3, the averages of male teacher candidates were higher than the females on the scale and its sub-factors. The difference in the affective factor was the highest compared to the others. So, it can be suggested that the attitude averages of female teacher candidates (X = 3.02) were quite lower than male participants (X = 3.72), and they had the lowest average in this analysis. An independent sample t-test was applied to test whether the differences were significant. According to the analysis results, the opinions of teacher candidates about online assessment differed significantly by gender (t (67) = - 3.24; p = 0.00). Significant differences were also found in practicality and suitability (t (67) = - 2.49; p <0.05) and affective factor subdimensions (t (67) = 3.25; p <0.05)

When the opinions about online assessment were evaluated by age, it was found that the groups had different averages, but Group 2 had the highest average (see Table 4). One-way ANOVA was performed to determine the significance level of the difference between groups (see Table 4). To the analysis results, the teacher candidates' opinions about online testing were significantly different for at least one of the age groups (F (2.66) = 3.42; p <0.05).

Table 4. *Distribution by class levels*

Age Group	N	X̄	SD	f	p	Post-Hoc Scheffe
1. Group 1	12	3.06	.63	3.42	**0.03**	2>1
2. Group 2	46	3.64	.64			
3. Group 3	11	3.65	.93			

Post-Hoc Scheffe test was performed to specify the groups with different opinion scores by age. The results are shown in Table 4. In this sense, the scale total scores were significantly higher in group 2 ($\bar{x}$ = 3.64, SD = .64) than group 1 ($\bar{x}$ = 3.06; SD = .63) (p < 0.001).

The findings regarding the teacher candidates' opinions about the online exam by the registered course variable are given in Table 5. The results suggested that the students enrolled in the Authoring Languages (ASP) in PC Environment course were the most positive attitudes ($\bar{x}$ = 3.72, SD = .65), while the Algorithm Design and Development course had the lowest average in this group ($\bar{x}$ = 3.09, SD = .70). One-way ANOVA test that was applied to test the

statistical significance of the differences determined a meaningful variance in at least one group (F (2.66) = 4.55; p <0.05). However, the teacher candidates' scores were found to be above average in all course groups. The post-hoc Scheffe test was applied to find out the group with the difference, and the results revealed that the average of attitude scores in the Algorithm Design and Development group ($\bar{x}$ = 3.09, SD =.70) were significantly lower than the average scores in the Authoring Languages (ASP) in PC Environment ($\bar{x}$ = 3.72, SD = .65) and the Programming Languages II ($\bar{x}$ = 3.63, SD =.71) courses.

Table 5. *One-way ANOVA results by the registered course*

Courses	N	$\bar{x}$	SD	f	p	Post-Hoc Scheffe
1. Programming Languages II	25	3.63	.71	4.55	**0.01**	2>3 1>3
2. Authoring Languages (ASP) in PC Environment	28	3.72	.65			
3. Algorithm Design and Development	16	3.09	.70			

An independent sample t-test was used to analyze the difference in views of teacher candidates about having previous online testing experiences. According to the results summarized in Table 6, although the participants who had previously taken an online exam ($\bar{x}$ = 3.64; SD =.73) had a higher average than those who did not take ($\bar{x}$ = 3.42; SD =.69), the difference was not statistically significant (p> 0.05). Besides, it was observed that the average of the "Yes" options in the Affective factor and Practicality and Suitability subfactors was higher than "No" options while it was partially different in Reliability subdimension.

Table 6. *Independent sample t-test results*

Scale and Sub-factors	Previous experience in online testing	N	$\bar{X}$	SD	df	t	P
Scale	Yes	39	3.64	.73	67	-1.26	0.40
	No	30	3.42	.69			
F1: Practicality and suitability	Yes	39	3.64	.88	67	-1.53	0.13
	No	30	3.32	.85			
F2: Affective factor	Yes	39	3.56	.89	67	-.90	0.36
	No	30	3.36	.94			
F3: Reliability	Yes	39	3.79	.75	67	.09	0.92
	No	30	3.81	.71			

The participant teacher candidates were also asked to score their computer self-efficacy levels between 1 and 9. The data were collected in three groups (see Table 1). Since there was no student in the first group (since all the students are in the computer education and

instructional technology department, none of them defined themselves at level 1 in terms of computer self-efficacy), an independent sample t-test was performed to analyze the opinions of teacher candidates about online testing, depending on their self-efficacy levels (see Table 7). The findings suggest that the students at the 3rd level in the scale and its sub-factors had a higher average than the 2nd level students, and the differences were statistically meaningful.

Table 7. *Distribution of the data by computer self-efficacy levels and independent-sample t-test results*

Scale and Sub-factors	Computer self-efficacy level*	N	$\bar{X}$	SD	df	t	P
Scale	Level 2	15	3.03	.64	67	-3.30	**0.00**
	Level 3	54	3.69	.68			
F1: Practicality and suitability	Level 2	15	2.95	.87	67	-2.86	**0.00**
	Level 3	54	3.65	.82			
F2: Affective factor	Level 2	15	2.95	.73	67	-2.61	**0.01**
	Level 3	54	3.62	.91			
F3: Reliability	Level 2	15	3.40	.59	67	-2.50	**0.01**
	Level 3	54	3.91	.73			

* IT teacher candidates were asked to rate themselves about their computer self-efficacy level. Level 1, 1-2-3; Level 2, 4-5-6; Level 3, 7-8-9

3.2. Findings based on the qualitative data

The result of qualitative analysis within the scope of the teacher candidates' answers to open-ended questions on general opinions to online testing revealed eight themes as “comparison testing methods”, “instant benefit”, “fair evaluation”, “future intensions”, “social inequality”, “digital competencies”. Figure 2 shows generated themes and codes, and the frequency of mention of the codes.

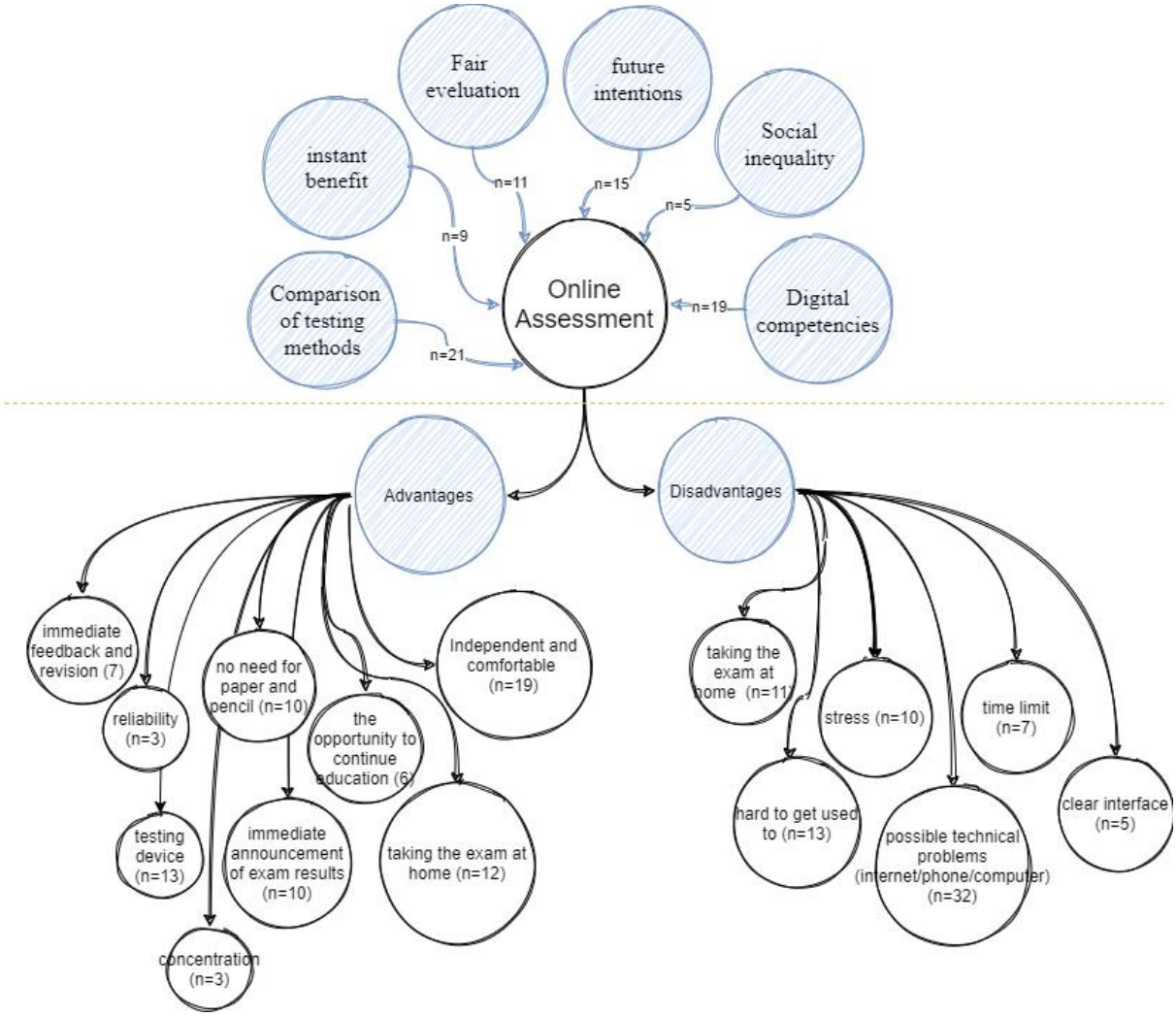

Figure 2. Themes and codes of qualitative analysis

In light of the themes that emerged from the analysis, the main advantage of online assessment according to many teacher candidates was taking the exams at their homes and feeling independence and comfort without a proctor. Besides, the immediate announcement of test results, evaluation of the mistakes, and not using a paper and pencil were also valuable. One of the students expressed his opinion related to advantages of online testing as below:

> *"We can easily take exams at home. We can understand the questions better as we have low anxiety." [s12]*

On the other hand, the most critical finding regarding the negative aspects of online testing was the possibility of technical problems on the internet, electricity, telephone or computers during the exam, and the resulting stress. Almost all students stated their anxiety about potential technical problems. However, they also indicated that they did not have any problems during the testing. Responses of two participants were as follows:

> *"Technology is not reliable and can let you down. The battery runs out, breaks down, or the internet goes down. A proctor can be flexible about timing, but time is predetermined in an online exam, and it ends when it is over." [s1]*

> *"Since it was not face-to-face interaction, I was more nervous in online exams. I was terrified if I would have a problem with the internet during the exam." [s22]*

In addition to the advantages and disadvantages of the online assessment method, it was determined that the students primarily compared the two assessment methods. Some students considered online testing a temporary and alternative assessment method rather than a permanent testing method. They claimed that online tests were practical tools used to save the day. One student indicated her feeling as follow:

> *"The online exam is a must for us now otherwise who would want to use it? Although it is easy for this process, it seems like I am not in university." [s2]*

Some of the students acknowledge the online tests as appropriate assessment methods, while other preferred homework as a fairer assessment method during the pandemic. When they were asked about their future attitudes towards online testing, almost all of the students suggested using online assessment methods in the future, while some recommended it only in certain circumstances.

> *"We have no other option under these circumstances. It could be homework, but I think it's a fairer method." [s4]*

> *"I think homework is a fairer assessment method in this environment. Because there is a labor there, but there is a possibility to cheat in these exams, so it should be homework, not exam" [s5]*

> *"It can be a suitable tool for certain lessons, but if I have a lot of writing or calculus, I prefer the paper and pencil exam." [s6]*

Besides, students from the southeastern and eastern provinces stressed that online tests created a social injustice due to the lack of digital tools and stable internet connections. For example, one student indicated this as follow:

> *"I did not have a computer; I was on the phone and I had a hard time. Although the screen was plain and clear, it took time to get used to it." [s8]*

Another finding revealed that most students experience online testing for the first time, which challenged their digital competence. In fact, although students were shown how to use the online test system before the test, students stated that it took time to get used to it.

4. Discussion and Conclusions

This study found that in spite of the radical decision to move to emergency remote teaching, learning and assessment, the IT pre-service teacher participants' attitude towards online testing was remarkably positive. When quantitative and qualitative findings are evaluated as a whole, it was determined that although the participants found online assessment practical, useful, and reliable, they had a certain stress level and anxiety about the online testing, especially related to potential technical problems. When the findings were considered in the context of the qualitative data and the literature, they were mostly consistent.

This study's findings are in agreement with what Jasil et al. (2020) found in their qualitative study. They found that students' attitudes towards online testing were generally positive, and a few students showed negative attitudes. In another study by Alsadoon (2017), students'

perceptions towards e-assessment were examined, and it was suggested that university students had a positive attitude towards this assessment method. Also, Gürsoy (2016), thesis study revealed that university students displayed positive attitudes towards online testing in the programming course. Likewise, Jawaid et al. (2015) found that students who favored multimedia use, automatic evaluation, and personalized feedback features had a positive attitude towards online testing.

The averages of male teacher candidates' attitudes towards online testing were higher than female candidates, and it was statistically significant. Hence, it can be inferred that female teacher candidates were generally less interested in online testing, but both groups were still above average. The male participants displayed more positive attitudes than females, which might stem from their attitudes towards computer applications (Akhter & Fatima 2018) or stereotypical thinking about gender in society. Although this study found that male participants are more positive towards online testing than females, little research studies support this finding (Sırakaya et al. 2014) while researchers mostly found no significant differences by gender (Başaran et al. 2017; Basol & Balgamis 2016; Bennet 2015). There are also a few studies that did not specify in terms of gender in whose favor the difference was (Basol & Balgamis 2016). Hence, it is seen that the difference was mostly in favor of men in online testing on gender factors.

Teacher candidates' attitudes towards online testing varied according to age. Furthermore, this difference was statistically significant. Although Dermo (2009) emphasized that there was no evidence that the older university students had more positive attitudes towards online examination, the teacher candidates' positive attitudes significantly increased by age. In addition, even if the studies on the age variable are limited in the literature, student attitudes towards the online testing were investigated according to the class level, and some studies did not show a difference in higher class levels (Lee et al. 2012; Başaran et al. 2017). It was observed that depending on their computer self-efficacy, the students in higher class levels had more positive attitudes (Bennett 2015). While the statistical significance of the "age" variable is not supported by the literature, the positive change in the attitude of older students towards online testing in this study can be explained by the level of computer self-efficacy.

In this study, teacher candidates' perspectives on online testing were also evaluated according to the course they were registered, and it was concluded that there was a significant difference in students' attitudes towards online testing, by course. Although there are different students in each course, basic computer skills and computer attitudes are considered to be at a similar level. Thus, it can be said that students expressed different opinions for some course groups. Since all of the participants in the current study were from the Computer and Teaching Technologies Department, and the same question types were used for each course, it can be deduced that the type of course is a determining factor in the attitude towards online testing.

When the effect of teacher candidates' previous online testing experiences on their attitudes was examined, the findings showed that those who had had online exams were quite positive, but it was not statistically significant. Studies in the literature underlined significant relationships between the number of online tests students attended and their attitudes. In a study carried out by Basol and Balgalmis (2016), a moderately positive significant relationship was found between the number of online tests and self-regulation, which was considered as an indicator of attitude. Similarly, according to Maurer (2006), students who had more experience in online testing had a more positive attitude, which was also confirmed by the same researcher in a different study (Maurer & Longfield 2015). Therefore, it can be said that the teacher candidates, who were more experienced in online testing and assessment, adopted positive perceptions about the suitability, preference, and reliability of the system.

There was a significant relationship between students' computer self-efficacy levels and attitudes towards online testing. Hence, the students who considered themselves advanced in computer technology had dramatically higher attitudes towards online testing than those at an average level. This finding is support by Lu et al. (2016) who found a significant relationship between university students' computer self-efficacy and their attitudes towards online testing. Similarly, Terzis and Economides (2011) stressed a correlation between computer self-efficacy and attitude and anxiety towards online tests. Balogun and Olanrewaju (2016) indicated that computer self-efficacy significantly predicted attitude and anxiety towards online testing. Accordingly, it is suggested that teacher candidates' computer skills directly affected their attitudes and anxieties towards online exams.

The participant candidates stated that the most significant benefit of online assessment during the Covid-19 pandemic was that they felt comfortable and independent in online exams. Also, the students expressed that taking an online exam at home eliminated various anxieties such as waiting for results, using paper and pencil, scoring errors, and concentration problems. Several studies in the literature supported this finding. The participants' responses with regards to the benefits of online testing is mirrored in the literature. Online assessment provides great benefits in immediate feedback (Terzis and Economides 2011; Kuo & Wu 2013; Nikou and Economides 2019), automated score processing (Retnawati 2015; Khairil and Mokshein, 2018; Nikou and Economides 2019), practice and budget (Gürsoy 2016; Albee 2015; Pawasauskas et al. 2014) and the limited use of paper and pencil (Marriott and Teoh 2019; Khairil & Mokshein 2018; Çalık & Altay, 2021) in the assessment of education. According to teacher candidates, the online testing was also critical in ensuring the continuity of education, especially during the pandemic.

According to IT pre-service teachers participants, the most significant anxiety in online testing was the possible technical problems. Although the students did not have any technical problems in the exams and they were explained that all answers were automatically recorded in the system and would not be lost, they admitted that it imposed stress and anxiety. Da'asin (2016) highlighted that the anxiety about possible technical problems was one of the determinants of student attitudes towards online testing. In this study, the anxiety can be explained by the limited online testing experience of the participants. It is predicted that such anxiety will alleviate with the rising number of online exams.

The study was carried out during the early stages of the Covid-19 pandemic, so although they showed positive attitudes towards online testing, almost all participants compared online tests with paper-pencil exams and concluded that online tests could not replace paper-pencil exams. Similarly, it can be seen in the literature that students frequently compared distance education with face-to-face education (Bozkurt 2020). The findings also indicated that the students who received asynchronous (Henriksen, Creely & Henderson 2020) or synchronous learning (Lowenthal, Borup, West & Archambault 2020) were hesitant to use the online testing method in the future due to the lack of technological facilities in their regions and their digital competencies.

5. Implications

The online testing method has become increasingly important thanks to technology development and becomes a valuable option when faced with unpredictable events. Although the literature shows a gradual increase in positive attitudes towards online testing, current findings of this study suggest considering the following points in learning management systems or an independent testing system to ensure the optimal benefit for students and practitioners.

Implication 1 – It should not be used just like face-to-face exams.

The students and practitioners should be able to use the potentials of an online testing system effectively. An online testing system offers many opportunities such as giving instant feedback, interacting with the test items, asking different types of questions and using different multimedia elements, including informative or attractive graphics, video or audio. An online testing should not only be an online version of the face-to-face exam, but should be turned into a more attractive environment for the student by being equipped with such features.

Implication 2 - The gender variable should not be ignored.

It is well-known that male students have more positive attitudes towards such systems than female students. Therefore, allowing female users to modify online system interface according to their preferences can provide an interface that will be more welcoming for them.

Implication 3 – An online testing system should provide effective feedback.

Students generally compare the online tests with the face-to-face exams as they might assume both methods same. If online tests were applied in a very similar way to face-to-face exams in which lecturers do not give students any feedback about what they did right or wrong in an exam, it would lead to students' indifference to online testing systems.

Implication 4 – Students should improve their digital skills.

Another remarkable finding was some students' hesitancy and bias due to the lack of experience and online testing competence. It can be solved using homework to improve students' computer skills or the simultaneous use of online homework and face-to-face exams until they get used to online testing systems.

6. Recommendations

In the light of the study results, it is suggested to carry out similar research with larger groups; and to include face-to-face interviews with lecturers, in order to have a better insight about the differences in the attitude of teacher candidates by course, age, and other variables, and to see online testing from the views of the lecturer; to investigate the attitudes of students at various departments, especially different from the computer and instructional technology because this group of students already have a background with computer and technology. It is also recommended to conduct the study with two different online testing systems to see the difference and similarities in preferences of students.

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