

Instructional Technology and Lifelong Learning Vol. 3, Issue 2, 207-224 (2022)

<https://dergipark.org.tr/tr/pub/itall>

ITALL

Research Article

ISSN: 2717-8307

A Review of the studies conducted on online exams in Turkey from the millennium to the coronavirus period

Ebru ALBAYRAK*¹ 

ARTICLE INFO

Article history:

Received: 24/10/2022

Accepted: 14/12/2022

Online: 31/12/2022

Published: 31/12/2022

Keywords:

Online exam

e-assessment

e-exam

evaluation in education

Covid-19

ABSTRACT

Online exams have an important place in meeting the needs of the digital age with some of their advantages. In terms of removing the time and place restrictions, it has become a structure that is greatly needed in measuring the competence of individuals, especially in emergencies such as during the coronavirus epidemic. In this respect, it is essential to reveal the status of online exams and identify and improve their deficiencies, especially for situations such as coronavirus. This research aims to examine the articles and theses made for online exams in Turkey between 2000-2022 and make suggestions for online exams' sufficiency and being prepared for the coronavirus period. The data obtained in the study were subjected to content analysis. In the research, there were articles and theses made between 2000-2022 on the Google academic engine, Dergipark, TÜBİTAK ULAKBİM, Ebsco and Eric sites, and online exams in the YÖK thesis database. There was a total of 68 studies, 55 articles, and 16 theses, on online exams in Turkey between these years. These studies were generally carried out in accordance with the survey design. Although many different variables are examined in the studies, the opinions about the online exams prepared within the scope of the relevant research were received the most. The purposeful sampling method was mostly used and the sample group consisted of undergraduate students in general. In the studies, the data were generally collected by the survey method, and the most descriptive quantitative analysis was applied to the data. The results of the study point to important directions for the development of an online

exam system and provide a guide for instructors.

* Corresponding Author, ebualb@gmail.com

¹Sakarya University, Türkiye



Milenyumdan koronavirüs dönemine Türkiye'de çevrimiçi sınavlar üzerinde yapılan çalışmalara ilişkin bir inceleme

MAKALE BİLGİ

Makale Geçmişi:

Geliş: 24/10/2022

Kabul: 14/12/2022

Çevrimiçi: 31/12/2022

Yayın: 31/12/2022

Anahtar Kelimeler:

Online sınav

e-değerlendirme

e-sınav

Eğitimde değerlendirme

Covid-19

ÖZET

Çevrimiçi sınavlar bazı avantajları ile dijital çağın ihtiyaçlarının karşılanmasında önemli bir yere sahiptir. Zaman ve mekan kısıtlamalarının kaldırılması açısından özellikle koronavirüs salgını gibi acil durumlarda bireylerin yetkinliklerinin ölçülmesinde son derece ihtiyaç duyulan bir yapı haline gelmiştir. Bu açıdan özellikle koronavirüs gibi durumlar için online sınavların durumunun ortaya çıkarılması ve eksikliklerinin tespit edilerek iyileştirilmesi gerekmektedir. Bu araştırma, 2000-2022 yılları arasında Türkiye'de çevrimiçi sınavlar ile ilgili üretilmiş makale ve tezleri inceleyerek çevrimiçi sınavların yeterliliği ve koronavirüs dönemine hazırlık için öneriler üretmeyi amaçlamaktadır. Çalışmada elde edilen veriler içerik analizine tabi tutulmuştur. Araştırmada YÖK tez veri tabanı, Google akademik motoru, Dergi park, TÜBİTAK ULAKBİM, Ebsco ve Eric sitelerinde yer alan çevrimiçi sınavlarla ilgili 2000-2022 yılları arasında üretilmiş makale ve tezler ele alınmıştır. Bu yıllar arasında Türkiye'de çevrimiçi sınavlarla ilgili 55 makale ve 16 tez olmak üzere toplam 68 çalışma üretilmiştir. Bu çalışmalar genellikle tarama desenine uygun olarak gerçekleştirilmiştir. Yapılan çalışmalarda birçok farklı değişken incelenmiş de en çok araştırmalar kapsamında hazırlanan çevrimiçi sınavlar hakkında görüşler alınmıştır. Çoğunlukla amaçlı örnekleme yöntemi kullanılmış olup, örneklem grubu genel olarak lisans öğrencilerinden oluşmaktadır. Araştırmalarda veriler genel olarak anket aracılığıyla toplanmış ve verilere genel olarak betimleyici nicel analiz uygulanmıştır. Çalışmanın sonuçları, bir çevrimiçi sınav sisteminin geliştirilmesine yönelik önemli noktalara

işaret etmekte ve eğitimler için bir rehber niteliği taşımaktadır.

1. Introduction

The new possibilities that emerged with the development of technology in the 21st century have triggered the search for a new environment for individuals to access information and demonstrate their competencies (Kereluik, Mishrai Fahnoe & Terry, 2013). On the one hand, the financial and place inadequacies that come with the rapid increase in the world population, on the other hand, the emergence of new skills such as information literacy has accelerated this process. With these challenges, the need for new forms of education and skills measurement revealed such as distance education and online measurement and evaluation, which do not include time and place restrictions (Gökçearslan, 2013). The coronavirus epidemic, which emerged at the end of 2019, has increased this need all over the world. Most countries around the world have suspended formal education for an indefinite period in order to prevent the spread of the epidemic, and then have chosen to carry out their education processes with distance education. While some of the measurement and evaluation processes were canceled completely, some of them were postponed. For example, in the UK, some exams were canceled during the corona period, and the students' in-class evaluations and the general exams after secondary and high school graduation (A-Level, AS Levels and GCSE) were scored with reference to their past grades (Gov.uk, 2020). This situation put students with low grades at a disadvantage. In some countries, on the contrary, successful students were counted as equal with unsuccessful students. For example, in Norway, 10th grade students were considered as high school graduates without an exam (Oslo, 2020). In Korea, the exams were postponed and after that, it was decided to conduct the exams of some courses at the high school level online. However, this situation both caused anxiety among students and brought suspicions of cheating (Asiatimes.com, 2020). At the university level, in general, exams were held online. However, the necessity of conducting the exams online which were planned to be held face-to-face, has brought with it the result that the measurement processes were not carried out with sufficient quality (Burgess & Sievertsen, 2020). Many countries around the world have carried out distance education processes on a larger scale than they have experienced before, without testing, and failed to show sufficient performance in both education and measurement processes (Burgess & Sievertsen, 2020). According to Andersen and Nielsen (2020), experiencing problems in the measurement processes causes a lack of motivation in individuals, and this may reduce their success grades. Therefore, there is a need for the measurement processes to be smooth and sufficient to meet the needs. In addition, considering the importance of identifying well-trained individuals who can contribute to the development of countries, examination systems should be sustainable both

in face-to-face and online environments, even in special situations that are indefinite and threatening the lives of individuals, such as the coronavirus epidemic.

From the perspective of Turkey, it is seen that the distance education initiative has been derived and developed in the last century in order to eliminate the inequality of opportunity and to benefit more from the performances of individuals (Serçemeli & Kurnaz, 2020). This date is far behind the world distance education history. However, with the development of the internet infrastructure and the increasing opportunities of individuals in accessing technology, distance education processes have turned into a more applicable form in Turkey as well as in the world (Ilgaz & Adanır, 2020; Wall, 2000). However, although distance education processes have improved, measurement processes in online environments cannot developed at the same speed (Coşkun & Mardikyan, 2016). Just as in the rest of the world, exams at primary and high school levels were postponed in Turkey during the coronavirus period, while exams at university level were held online. Given the latest studies in the literature, there is a need for innovative research to ensure that an alternative exam opportunity is available at all levels, and that the online exams can be used smoothly and effectively, to ensure low anxiety and to prevent insecurities such as cheating. Therefore, it is important to study on these environments and progress them. Various university student attitudes, either positive or negative, were observed in online exams (Binnahedh 2022; Rajeh et al., 2022).

1.1. Online Exam

The online exams have emerged in close relation with online education. Online education is an innovative method in acquiring new skills required by the digital age and development of education system (Alonso-Díaz & Yuste-Tosina, 2015; Wang, 2008). With online education, learning environments can be delivered to a large number of students without limitation of time and place. However, for these environments to be effective, adequate quality and technical support must be provided (Başaran, Yalman, & Erkan, 2017; Santally & Raverdy, 2006). Thus, the need for both measure the effectiveness of a course and determine the proficiency of individuals in a certain subject has triggered the search for these environment (Boitshwarelo, Reedy & Billany, 2017) and concepts such as online exam, e-exam or e-assessment have emerged. According to Tüfekci, Ekinci, & Köse (2013), online exams mean that the processes of preparing and administering an exam using online facilities and collecting and announcing the results are carried out in web-based environments. In this respect, evaluation processes are designed and implemented through online tools (Kumalar & Pürtaş, 2012). In order to meet the expected needs, online exams should provide certain competencies such as being valid, reliable, fair and flexible (Al-Mashaqbeh ve Al Hamad, 2010). According to Battal and Çağiltay (2015), the exam system should be easy to access and use,

the questions should be free from distractions. In comparative studies on the exam types, the online exams were found to be close to the classical exams in terms of usefulness and reaching the purpose, and positive contributions were made to the learning process (Karakaya, 2001). Online exams provide a serious equality of opportunity for people who are far from the institution where they are studying. For online learning environments where the distance is too far, online exams may be mandatory. Another benefit of online exams is that they reduce stationery costs (Angus, & Watson, 2009). In this way, there is no need for tools such as exam papers, pen, ink and printer. An important privilege of this environment is that it is easy to monitor that students' time spend on questions, solution steps for problems, perform on activities and answers with recording system. In the process of preparing the exam questions, the opportunities provided by the interface and automatic grading also provide convenience (Llamas-Nistal, Fernandez-Iglesias, Gonzalez-Tato, & Mikic-Fonte, 2013) and the questions can be automatically presented at random (Rowe, 2004). With its features, online exams are useful and beneficial both for diagnostic, formative, summative (Laine, Sipilä, Anderson, & Sydänheimo, 2016) and self-assessments (Sorensen, 2013).

Despite these benefits, there are also aspects where online exams fall behind compared to classical exams. For example, the time allowed in classical exams may not be sufficient for the same exam in online environments, or new methods may be required to measure different abilities (Roberts ve Verbyla, 2003). In addition, the technical problems requires expertise and a risk plan for each exam may be needed. As a new measurement method, individuals' anxieties and thoughts about this measurement environment can also be affected. While some individuals view these environments positively (Karalı, et al, 2021; DeSouza & Fleming, 2003), others may be biased towards them (Çiğdem & Tan, 2014). In addition, negative situations such as cheating (Harmon & Lambrinos, 2008) or including others in the exam instead of herself/himself should be prevented. To achieve this, it will be useful to use process-oriented assessment, to ask questions that only the person who must take the exam can know, and to apply different assessment methods such as homework and portfolio quizzes (Balta & Türel, 2013). If the problems are not overcome in online exams can measurement processes may be complicated (Liu, Chen, ve Lu, 2015). As a result, online exams are a problematic area to study on. Developing new measurement tools, evaluating their effectiveness, and receiving feedback from both students and teachers about these tools will contribute to the development of measurement processes (Coşkun & Mardikyan, 2016). In order to obtain qualified online exam environments, it is necessary to design these environments well. However, there are many problems with online exams in Turkey (Tekin, 2021; Afacan Adanır, İsmailova, Omuraliev, & Muhametjanova,

2020; Başol, Ünver, & Çiğdem, 2017; Coşkun & Mardikyan, 2016). In this respect, it is important to examine the research made in Turkey and report the current situation to reveal deficiencies. In the research, studies on online exams throughout Turkey in the literature were systematically examined and the results were reported and necessary suggestions were made. The problem statement of the research is as follows; “What are the method, year, discipline area, sample selection method and sample characteristics, data collection tools used, data analysis method, and examined variables of the studies conducted for online exams in Turkey from the Millennium to the Coronavirus period?”

2. Method

2.1. Research Scope and Model

In the research, articles, and theses on online exams with Turkey examples between the years 2000-2022 (from millennium to the coronavirus period) were examined. These studies were accessed from databases using the keywords include "online exam", "e-assessment", "e-exam", "online assessment", "online-examination" both in Turkish and English languages. Google Academic, Dergi park, TÜBİTAK ULAKBİM, EBSCO, and ERIC sites were used for accessing the articles and the YÖK thesis database were used for the theses. The selection of the studies was based on the years 2000-2022. If there are articles of thesis publications, only the articles have been taken into account in order not to investigate the same studies. Among the studies examined in the research, 68 studies were within the scope of the research in the last months of 2022. This study does not require an ethics committee certificate since it does not contain any private data.

2.2. Data Analysis

Content analysis was applied to the studies within the scope of the research. The data of the study were analyzed by coding method. The codes in which the data were transformed were gathered under the determined themes. The analyzes were also examined by a field expert and 100% agreement was obtained. The data were presented by creating classification tables by determining the frequency and percentages. The percentages in each table represent the percentage of the group they are in and have been rounded to integers for ease of reading.

3. Result

The findings of the studies conducted between 2000-2022 on online exams in Turkey are included in this section. The frequencies and percentages of the data obtained are presented in the classification tables below. Because

some studies include more than one element at the same time, some total scores in the tables are higher than the number of studies. The distribution of studies by type is presented in Table 1.

Table 1.

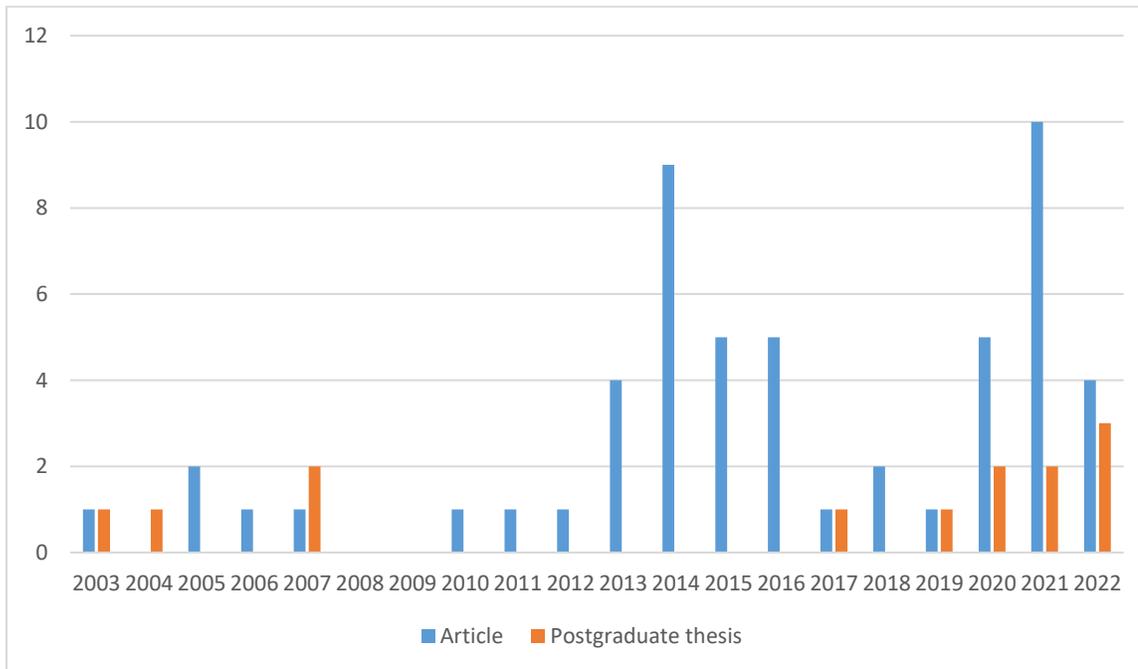
Distribution of studies by types

Type of study	f	%
Article (Turkish)	41	60
Article (English)	14	21
Postgraduate thesis (Master)	11	16
Postgraduate thesis (Ph.D.)	2	3
Total	68	100

There are 55 articles on online exams produced in Turkey between 2000-2022 and 41 of these studies were written in Turkish and 14 were written in English. When the national thesis database of YÖK is examined, it is seen that 11 master's and 2 doctoral thesis have been carried out. According to the data, studies were mostly produced in the form of Turkish articles. The distribution of the studies according to the years they were published and their types is given below.

Figure 1.

Distribution of studies by years and types



As seen in Figure 1, no articles or theses were produced between 2000-2003 for online exams in Turkey. 1 article and 1 postgraduate thesis study were first made in 2003. In 2014, only 9 articles were produced. The number of

the studies decreased again towards 2019. A noticeable increase started in 2020 when coronavirus period began to spread, and this increase was greater than ever before in 2021. However, in 2022, there has been a severe decrease in the amount of produced studies.

In general, before the coronavirus period, almost every year, a small number of regular articles were published, and rare graduate theses were produced. In addition to the years 2000-2003, no publications were produced in 2008 and 2009. After the coronavirus period, there has been an increase in the number of studies. The variables examined in the studies examined within the scope of the research are given in Table 2.

Table 2.

Distribution of studies by study types according to the variables examined

Variable	Article		Postgraduate Thesis		Total
	f	%	f	%	f
Perceived Ease of Use	3	6	-	-	3
Perceived usefulness	2	4	-	-	2
Perceived benefit	2	4	-	-	2
Self-sufficiency	1	2	1	7	2
Quality of Service (Accessibility)	2	4	-	-	2
Technical support	1	2	-	-	1
User interface design	1	2	1	7	2
Opinion on the online exam system	11	20	3	20	14
The perception of the online exam system	4	7	2	13	6
Social impact	1	2	-	-	1
Computer Self-efficacy	1	2	1	7	2
Behavioural intention to use	1	2	-	-	1
The online exam system expectation	2	4	-	-	2
User satisfaction	2	4	-	-	2
Online exam attitude	5	9	-	-	5
Course success	8	15	2	13	10
The computer attitude	2	4	-	-	2
Satisfaction	4	7	-	-	4
Exam time	-	-	1	7	1
Motivation	-	-	1	7	1
Metacognition	-	-	1	7	1
Technology acceptance	-	-	1	7	1
Transparency-fairness of the system	1	2	-	-	1
Security	-	-	1	7	1
Computer anxiety	-	-	1	7	1
Exam anxiety	1	2	1	7	2
Usefulness	-	-	1	7	1
Exam effects	1	2	1	7	2
Attitude	-	-	2	13	2
Total	54		15		69

According to Table 2, among the studies on online exams, the opinion on the online exam system (f:14) were examined the most. This variable was followed by success in the course (f:10), perception of the online exam system (f:6) and online exam attitude (f:5). Other variables included were perceived ease of use (f:3), perceived usefulness (f:2), service quality (accessibility) (f:2), user interface design (f:2), computer self-efficacy (f:2), user satisfaction (f:2), the computer attitude (f:2), the system expectations (f:2), exam anxiety (f:2), satisfaction (f:4), behavioural intention to use (f: 1), social impact (f:1), self-efficacy for use (f:1), technical support (f:1), (spent) exam time (f:1), motivation (f:1), metacognition (f:1), technology acceptance (f:1), system transparency-fairness (f:1), security (f:1), computer anxiety (f:1) and usefulness (f:1). Considering the study types, the most examined variables among the articles were the opinion on the online exam system (f:11), the course success (f:8) and online exam attitude (f:4). In the theses, opinion on the online exam system (f:3), the perception of the system (f:2) and course success and attitude (f:2) were the variables. The publications examined within the scope of the research are carried out using different research designs. The data related to the subject are presented in Table 3.

Table 3.

Distribution of research designs used in studies

Research Design	Article		Postgraduate Thesis		Total f
	f	%	f	%	
Survey-Scale development	6	10	4	25	10
Experimental Research	4	7	2	13	6
Survey Research	17	29	4	25	21
Correlational Research	1	2	-	-	1
Case Study	2	3	1	6	3
Grounded theory	9	15	-	-	9
Design-Based	-	-	1	6	1
Descriptive Research	1	2	2	13	3
Phenomenological Research	2	3	-	-	4
Mixed Research	7	12	2	13	7
Other – Introducing an Online Exam System	10	17	-	-	10
Total	59		16		75

According to Table 3, 21 of the studies on online exams were carried out in accordance with the survey design. This pattern is followed by other- introducing an online exam system (f:10), survey-scale development (f:10), experimental (f:6) and grounded theory (9) research. Among the studies, introducing an online exam system named in the "other" category were the most after the articles that adopted survey design. In these articles, the researchers introduced an online exam system that was produced by the researchers. In graduate theses, survey-scale development (f:4), survey research (f:2), descriptive (f:2), mixed (f:2), experimental (f:2) case study (f:1), and

design-based (f:1) methods are preferred. The studies used various tools for data collection. These tools were classified according to their types. Relevant data are presented in Table 4.

Table 4.

Distribution of data collection tools used in the studies

Data collection tool	Article		Postgraduate Thesis		Total
	f	%	f	%	f
Success/knowledge test	9	16	1	5	10
Interview form	11	19	7	35	18
Questionnaire	26	46	10	50	36
Document	11	19	1	5	12
Observation Form	-	-	1	5	1
Total	57		20		77

According to Table 4, the most used data collection tool is the questionnaire (f:36). This tool is followed by interview form (f:18), success/knowledge test (f:10), document (f:12) and observation form (f:1). As for the types of studies, the questionnaire was used the most (f:22) among the articles. Again, questionnaires (f:10) were used the most in the theses. Interview form (f:7), success/knowledge test (f:1), document (f:1) and observation form (f:1) followed this tool. As another focus of the research, the sample levels of the studies other than introducing a system were examined. Relevant data are given in the Table 5.

Table 5.

Distribution of studies by study type by sample level

Sample Level	Article		Postgraduate Thesis		Total
	f	%	f	%	f
Primary education	4	9	-	-	4
High school	5	11	-	-	3
Undergraduate	27	60	11	69	38
Postgraduate	2	4	1	6	3
Graduate	-	-	1	6	1
Teacher (Primary and high school)	4	9	1	6	5
Administrator (school)	1	2	1	6	2
General	2	4	-	-	2
Other (expert)	-	-	1	6	1
Total	45		16		61

According to data, most of the studies on online exams conducted at undergraduate level (f:38). On the basis of study types, most of the studies are, again, at undergraduate level in articles and postgraduate theses (f: 27 and f:

11). Among the articles, the example of online exams included primary education, high school, undergraduate, postgraduate level students and also included teacher (primary education and high school), administrator (School) and general sample. The theses in the YÖK database were studied with sample groups of undergraduates, postgraduates, graduates, teachers (primary and high school), administrators and experts. Apart from these data, the sample numbers of the studies on online exams produced in Turkey other than the introducing of a system are given in Table 6.

Table 6.

Distribution of studies by study types according to the number of samples they include

Number of Samples	Article		Postgraduate Thesis		Total
	f	%	f	%	
1-30	5	13	1	8	6
31-100	5	13	5	38	10
101-300	11	29	5	38	16
301-500	8	21	2	15	10
500-1200	7	18	-	-	7
1200+	2	5	-	-	2
Total	38		13		51

According to data, studies mostly included 101-300 people (f:16). According to study types, a sample group of 101-300 people was studied the most in articles and 31-100 people in theses. The distribution of these samples according to study types in terms of a selection type is given in Table 7.

Table 7.

Distribution of studies by study types according to the sample selection type they include

Sample Selection Type	Article		Postgraduate Thesis		Total
	f	%	f	%	
Purposive	26	76	11	85	37
Random	6	18	1	8	7
Convenience	2	6	1	8	3
Total	34		13		47

According to Table 7, purposive sampling method (f:37) was used the most among the studies. This method was followed by random (f:7) and convenience (f:3) sampling methods. Based on study types, all three methods are used in the articles and the theses. The distribution of the studies examined within the scope of the research according to the data analysis method used is presented in Table 8.

Table 8.

Distribution of studies by study types according to the analysis methods used

Analysis Method	Article		Postgraduate Thesis		Total
	f	%	f	%	f
Descriptive quantitative-Frequency/percent, mean, graph	15	25	7	32	22
Correlation (Pearson product-moment)	1	2	2	9	3
T-test	13	22	1	5	14
ANOVA	10	17	2	9	12
ANCOVA	1	2	-	-	1
Structural Equation Modeling	4	7	1	5	5
Factor Analysis	2	3	-	-	2
chi-square	1	2	2	9	3
Kruskal Wallis	1	2	-	-	1
Mann Whitney U	1	2	-	-	1
Qualitative-Content analysis	9	15	4	18	13
Qualitative-Descriptive Analysis	2	3	3	14	5
Total	60		22		82

According to the data, quantitative methods were used the most among the studies and descriptive quantitative methods (f:22) were used the most among these methods. This method is followed by t-test (f:14), qualitative-content analysis (f:13) ANOVA (f:12), and qualitative-descriptive analysis (f:5) methods. Apart from this, Structural Equation Modeling (f:5), chi-square (f:3), factor analysis (f:2), correlation (f:3), Ancova (f:1), Mann Whitney U (f:1) and Kruskal Wallis (f:1) tests were also used. In terms of study types, the descriptive quantitative (frequency/percentage, mean, graphing) method (f:15 and f:7) was used the most in data analysis among articles and theses. In the articles, these methods were followed by t-test (f:13), Anova (f:10), structural equation modeling (f:4), and content analysis (f:9). In theses, descriptive quantitative (frequency/percentage, average, graphing) method (f:7) was used the most.

4. Discussion, Conclusion, and Recommendations

The needs in education brought by the digital age emphasize the necessity of an environment that can measure the competencies of individuals remotely. In this respect, it is important to examine the point reached by the studies on online exam environments. With this research, studies on online exams from past to present in Turkey were analyzed and the results were reported.

According to the findings obtained in the research, there are various studies conducted for online exams in Turkey between the years 2003-2020. Studies on the subject started in 2003, and after a while, it stagnated. Although it

started to rise again after a few years, its numbers have decreased again in recent years. When it comes to the corona period, this decline has stopped and there has been a slight increase in the number of studies for online exams in 2020 and a severe increase 2021. After that, there is a decrease in the number of produced studies in 2022. The coronavirus disease began in 2019, and studies about online exams during the corona period were mostly published in 2020 and 2021. In 2022, when the number of sick people decreased, the number of studies decreased considerably. It is thought that the point reached is not sufficient, as large systems have not been produced and tested in order to meet the current problems (Tekin, 2021; Afacan Adanır, İsmailova, Omuraliev, & Muhametjanova, 2020). The majority of the studies produced are articles.

In the studies, mostly an online exam system produced by the researchers introduced. As for studies with human sample, the opinions on an online exam system were examined the most. In addition, course success and online exam system perception and attitude were also frequently examined. Perceived ease of use, perceived usefulness, user satisfaction, computer attitude, perceived usefulness, self-efficacy, service quality (accessibility), technical support, user interface design, social impact, computer self-efficacy, behavioural intention to use, expectation towards the system, user satisfaction, course success, satisfaction, (spent) exam time, motivation, metacognition, and technology acceptance. According to the study types, while the views and attitudes on the online exam system and course success were examined the most in the articles, the system perception and the course success took place as variables in the theses.

As for the design of the studies on online exams, the survey design was used the most. This design was used because the effectiveness of a system developed within the article was examined. However, it is noteworthy that in many articles, the examination system was not tested after it was developed, but only introduced. On the other hand, experimental and descriptive research designs were the mostly used in postgraduate theses.

In the studies the surveys were the most used as data collection tool. As for the study types it is same for article and thesis. In addition, interview form, success/knowledge test and document tools are frequently preferred. In terms of sample level, most of the research was done at the undergraduate level. On the basis of study types, most of the articles and postgraduate theses studied at the undergraduate level. In addition, primary education, high school, undergraduate, postgraduate levels, graduates, teachers (primary education and high school), administrators (School) and experts were also studied. Among postgraduate theses, online exams were mostly studied with the undergraduate students. The sample size of the studies generally was between 101-300 people. The studies were carried out with fewer people in postgraduate theses, while it was the same in the articles. These

sample groups were generally reached by using the purposive sampling method. In addition, random and convenience sampling methods were also used. In terms of study types, in theses, only the purposive sampling method was used.

Quantitative methods were mostly used in the analysis of the data obtained in the studies. Among the quantitative methods, the descriptive quantitative (frequency/percentage, average, graphing) method was used the most. Apart from this method, independent t-test, content analysis and descriptive analysis methods were also frequently used.

The findings indicated that, although there are various studies on online exams, it has not yet reached the point to meet the emerging needs (Burgess & Sievertsen, 2020). Many of the research is theoretical and more experimental research with application in the field is needed (Muzaffar, Tahir, Anwar, Chaudry, Mir, & Rasheed, 2021). The change in expectations with new technologies, the increasing population and especially epidemic diseases such as corona, force countries to use the online exam environment to carry out assessment properly as well as providing education remotely. The corona period affected both students and teachers differently. According to the study of Amzalag, Shapira, & Dolev (2021), students were more worried about online exams during the corona period, their tendency to cheat increased, and their confidence in each other decreased. In addition, both students and instructors had a negative attitude towards online exams in this period. According to a study, anxiety in students also negatively affected their self-confidence (Arslan, Semenderoğlu ve Uyanık, 2022; Arora, Chaudhary, & Singh, 2021). Finally, despite the efforts, there are still problems in online exams such as workload, security and cheating (Ebaid, 2021; Alsadoon, 2017). These concerns are the same in Turkey (Arslan, Semenderoğlu ve Uyanık, 2022; Tekin, 2021). While the instructors need additional time to prepare the online exam questions, the institutions have to fix the systemic problems and ensure that the learners take the exam in a fair environment (Afacan Adanır, İsmailova, Omuraliev, & Muhametjanova, 2020). Also learners may be adversely affected by the process due to their own technical problems (Başol, Ünver, & Çiğdem, 2017). More research is needed on online exams in Turkey, so that the advantages of the online exam environment can be fully utilized and the disadvantages can be explored and eliminated with various samples (Arslan, Semenderoğlu ve Uyanık, 2022; Coşkun & Mardikyan, 2016).

In future studies, online exam elements that have been little or never examined (e.g. components that increase exam anxiety, question presenting format such as being in the same or different pages, page and text format, information on online exam adequacy) (Albayrak, 2014) could be studied. In addition, individual variables such

as online exam readiness, being affected by external factors (screen reflection, slow operation of the exam system, etc.), technology knowledge, visual impairments, epilepsy may be examined in studies with larger sample groups and different data collection methods. Such factors may affect student anxiety (Çiğdem & Tan, 2014; DeSouza & Fleming, 2003) and attention and cause a decrease in success. Also, using the different exam types for interactive, continuous, creative assessment may be beneficial (Wahid, & Farooq, 2020). In the future studies the effects of various exam types such as homework and portfolio quizzes (Balta & Türel, 2013) on different student groups may be investigated. Studies on technical problems that may be encountered in exam systems, risk scenarios and urgent solutions that can be offered in such cases may be conducted (Başaran, Yalman, & Erkan, 2017). It has been observed that the current studies mostly work with undergraduate students. The reason for this is thought to be easier to carry out the research process in universities in terms of obtaining permission and application. Further studies may study more deeply on other sample groups. In addition, few studies have been found on how to develop field-specific skills by developing online exam types. In this regard, there is a need for new studies with various exam types and interface designs, taking into account the skills specific to each field. Also continuous evaluation may be more beneficial for a more reliable assessment (Mata, 2021). In addition, in the current age, distance education is becoming more widespread in the rapidly digitalizing world. For this reason, it is recommended to prepare and test online exam systems that can meet the needs in large scale population both for distance education-based trainings and periods such as corona that make face-to-face education almost impossible.

Ethical Declaration

In this study, all scientific ethical rules were followed.

Conflict Interest and Author Contributions

All stages of the study were organized and conducted by the Author. There is no conflict of interest.

5. References

- Afacan Adanır, G., İsmailova, R., Omuraliev, A., & Muhametjanova, G. (2020). Learners' perceptions of online exams: A comparative study in Turkey and Kyrgyzstan. *International Review of Research in Open and Distributed Learning*, 21(3), 1-17.
- Albayrak, E. (2014). The Effects of Design Factors on Students' Success and Test Anxiety in Electronic Tests. *International Online Journal of Educational Sciences*, 6(2).

- Al-Mashaqbeh, I. F., & Al Hamad, A. (2010, May). Student's perception of an online exam within the decision support system course at Al al Bayt University. In *2010 Second International Conference on Computer Research and Development* (pp. 131-135). IEEE.
- Alonso-Díaz, L., & Yuste-Tosina, R. (2015). Constructing a grounded theory of e-learning assessment. *Journal of educational computing research*, 53(3), 315-344.
- Amzalag, M., Shapira, N., & Dolev, N. (2021). Two Sides of the Coin: Lack of Academic Integrity in Exams During the Corona Pandemic, Students' and Lecturers' Perceptions. *Journal of Academic Ethics*, 1-21.
- Andersen, S. C., & Nielsen, H. S. (2020). Learning from performance information. *Journal of Public Administration Research and Theory*, 30(3), 415-431.
- Angus, S. D., & Watson, J. (2009). Does regular online testing enhance student learning in the numerical sciences? Robust evidence from a large data set. *British Journal of Educational Technology*, 40(2), 255-272.
- Arora, S., Chaudhary, P., & Singh, R. K. (2021). Impact of coronavirus and online exam anxiety on self-efficacy: the moderating role of coping strategy. *Interactive Technology and Smart Education*.
- Arslan, K., Semenderoğlu, A., & Uyanık, E. (2022). An Investigation of Students' Preferences, Satisfaction and Performance in Online Assessment Amidst the COVID-19 Pandemic in Türkiye. *Malaysian Online Journal of Educational Technology*, 10(4), 294-305.
- Asiatimes.com, (2020). Students test positive as Korean schools reopen. 8.08.2020 tarihinde www.asiatimes.com adresinden erişilmiştir.
- Balta, Y., & Türel, Y. K. (2013). Çevrimiçi Uzaktan Eğitimde Kullanılan Farklı Ölçme Değerlendirme Yaklaşımlarına İlişkin Bir İnceleme. *Electronic Turkish Studies*, 8(3).
- Battal, A., & Çağiltay, K. (2015). Investigation of Usage Frequency and Department on Usability Issues with the Online Examination System (OSSI). *Mersin University Journal of the Faculty of Education*, 11(3).
- Başaran, B., Yalman, M., & Erkan, S. (2017). Evaluation of Students' Attitudes towards e-Exams and Use of Technology in Theology Distance Undergraduate Education Programs. *Hitit Üniversitesi İlahiyat Fakültesi Dergisi*, 16(31), 277-299.
- Başol, G., Ünver, T. K., & Çiğdem, H. (2017). Ölçme değerlendirme dersinde e-sınav uygulanmasına ilişkin öğrenci görüşleri. *Uluslararası Türk Eğitim Bilimleri Dergisi*, 2017(8), 111-128.
- Binnahedh, I. A. (2022). E-assessment: Wash-back effects and challenges (Examining students' and teachers' attitudes towards e-tests). *Theory and Practice in Language Studies*, 12(1), 203-211.
- Boitshwarelo, B., Reedy, A. K., & Billany, T. (2017). Envisioning the use of online tests in assessing twenty-first century learning: a literature review. *Research and Practice in Technology Enhanced Learning*, 12(1), 16.
- Burgess, S., & Sievertsen, H. H. (2020). Schools, skills, and learning: The impact of COVID-19 on education. *VoxEu.org*, 1.
- Büyükoztürk, Ş., Kiliç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş. ve Demirel, F. (2016). *Bilimsel Araştırma Yöntemleri*. (Onbirinci Baskı). Ankara: Pegem A. Yayıncılık.
- Çiğdem, H., ve Tan Şeref, (2014). Matematik dersinde isteğe bağlı çevrimiçi kısa sınav uygulanması hakkında öğrenci görüşleri. *Journal of Computer and Education Research*, 2(4), 51-73.

- Coşkun, M., & Mardikyan, S. (2016). Çevrimiçi Ölçme ve Değerlendirme Sistemlerinin Gerçekleşen Kullanımını Belirleyici Faktörler: Bir Yapısal Eşitlik Modellemesi (YEM) Çalışması. *Eğitim ve Bilim*, 41(188).
- DeSouza, E., & Fleming, M. (2003). A comparison of in-class and online quizzes on student exam performance. *Journal of Computing in Higher Education*, 14(2), 121-134.
- Ebaid, I. E. S. (2021). Cheating among Accounting Students in Online Exams during Covid-19 Pandemic: Exploratory Evidence from Saudi Arabia. *Asian Journal of Economics, Finance and Management*, 9-19.
- Gökçearslan, Ş. (2013). Developing a Scale. for the Sense of Community in Online Learning: A Validity and Reliability Study. *Turkish Librarianship*, 27(1), 154-165.
- Gov.uk, (2000). Education and childcare during coronavirus. Retrieved from www.gov.uk/government/publications.
- Harmon, O. R., & Lambrinos, J. (2008). Are online exams an invitation to cheat?. *The Journal of Economic Education*, 39(2), 116-125.
- Ilgaz, H., & Adanır, G. A. (2020). Providing online exams for online learners: Does it really matter for them?. *Education and Information Technologies*, 25(2), 1255-1269.
- Karakaya, Z. (2001). Development and implementation of on-line exam for a programming language course. *Uluslararası Açık ve Uzaktan Eğitim Sempozyumu*, 23-25 Mayıs, Eskişehir.
- Karalı, Y., Coşanay, G., & Şen, M. (2022). How Ready are Primary School Students for Online Mathematics Exams?. 19. Uluslararası Sınıf Öğretmenliği Eğitimi Sempozyumu. 12-14 Kasım. Urfa.
- Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of digital learning in teacher education*, 29(4), 127-140.
- Laine, K., Sipilä, E., Anderson, M., & Sydänheimo, L. (2016, September). Electronic exam in electronics studies. In 44th SEFI annual conference. Tampere. Finland. <https://www.sefi.be/wp-content/uploads/2017/09/laine-electronic-exam-in-eletronics-studies-9.pdf>
- Liu, I. F., Chen, R. S., & Lu, H. C. (2015). An exploration into improving examinees' acceptance of participation in an online exam. *Journal of Educational Technology & Society*, 18(2), 153-165.
- Llamas-Nistal, M., Fernández-Iglesias, M. J., González-Tato, J., & Mikic-Fonte, F. A. (2013). Blended e-assessment: Migrating classical exams to the digital world. *Computers & Education*, 62, 72-87.
- Mata, J. R. (2021). How to Teach Online? Recommendations for the assessment of online exams with University students in the USA in times of pandemic. *IJERI: International Journal of Educational Research and Innovation*, (15), 188-202.
- Rajeh Alsalhi, N., Darweesh Qusef, A., Sulieman Al-Qatawneh, S., & Elmagzoub Eltahir, M. (2022). Students' perspective on online assessment during the COVID-19 pandemic in higher education institutions. *Information Sciences Letters*, 11(1), 10.
- Rowe, N. C. (2004). Cheating in online student assessment: Beyond plagiarism. *Online Journal of Distance Learning Administration*, 7(2).
- Wang, T. H. (2008). Web-based quiz-game-like formative assessment: Development and evaluation. *Computers & Education*, 51(3), 1247-1263.

- Kumalar, M., & Pürtaş, M. (2012). A Study for Primary School Students Self-Assessment and Elimination of Their Incompletes. In *Proceedings of XIV th Akademik Bilisim Conference*, 129-132.
- Santally, M. I., & Raverdy, J. (2006). The master's program in computer-mediated computer communications: A comparative study of two cohorts of students. *Educational Technology Research and Development*, 54(3), 312-326.
- Muzaffar, A. W., Tahir, M., Anwar, M. W., Chaudry, Q., Mir, S. R., & Rasheed, Y. (2021). A Systematic Review of Online Exams Solutions in E-Learning: Techniques, Tools, and Global Adoption. *IEEE Access*, 9, 32689-32712.
- Serçemeli, M., & Kurnaz, E. (2020). A research on students' perspectives to distance education and distance accounting education in the covid-19 pandemia period. *International Journal of Social Sciences Academic Researches*, 4(1), 40-53.
- Sorensen, E. (2013). Implementation and student perceptions of e-assessment in a Chemical Engineering module. *European Journal of Engineering Education*, 38(2), 172-185.
- Tufekci, A., Ekinci, H., & Kose, U. (2013). Development of an internet-based exam system for mobile environments and evaluation of its usability. *Mevlana International Journal of Education*, 3(4), 57-74.
- Wahid, R., & Farooq, O. (2020). Online exams in the time of COVID-19: quality parameters. *International Journal of Social Sciences and Educational Studies*, 7(4), 13-21.
- Wall, J. E. (2000). *Technology-Delivered Assessment: Diamonds or Rocks? ERIC/CASS Digest*. Greensboro, NC: ERIC Counseling and Student Services Clearinghouse.
- Roberts, G. H., & Verbyla, J. L. (2003, January). An online programming assessment tool. In *Proceedings of the fifth Australasian conference on Computing education-Volume 20* (pp. 69-75).
- Oslo, (2020). Schools and kindergartens. Retrieved from <https://www.oslo.kommune.no/>.