Online Exams: An Opportunity or A Threat?

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To Cite This Chapter

Hebebci, M. T., & Yılmaz, O. (2022). Online exams: An opportunity or a threat?. In M. T. Hebebci, & O. Yılmaz (Eds.), *Current Studies in Educational Disciplines 2022* (pp. 87-117). ISRES Publishing

Introduction

Educational institutions benefit from distance education programs to reach more students and provide equality of opportunity among learners. There are important initiatives in this context on a global and national scale (Coursera, Khan Academy, edX, & Udacity, etc.). The number of these initiatives and contents is increasing day by day (Galante, 2002). At first, distance education was considered an alternative or supporting factor to traditional education (face-to-face education) (Wang, 2008). However, today, especially with the development of software and network technologies, distance education has become much more than a supporter and alternative to traditional education (Allen & Seaman, 2008).

At present, universities, schools, certificate programs, and courses conduct education and training programs only through distance education. Berkeley University, Udemy, Coursera, Khan Academy, Harvard University, and Udacity are some of these

institutions and platforms worldwide. For example, thanks to Coursera, learners could attend the courses given by faculty members working in the world's leading universities worldwide without paying a higher education fee. Participation documents and certificates can be obtained if the necessary conditions are met. edX, another similar initiative, offers the opportunity to take courses from the world's leading universities, such as Harvard University, Georgetown University, and the University of Chicago. Udacity, on the other hand, offers a nanodegree program for individuals who want to specialize in talent or pursue a full-time career. Another similar initiative is Udemy, which is also widely used. Udemy is a massive open online course founded in 2010, featuring adult and student-oriented courses by expert instructors. As of July 2022, there are 75 different languages, 54 million learners, over 70 thousand instructors, more than 200 thousand courses, and 740 million course enrollments (Udemy, 2022).

Discussions on education continue intensely with regard to distance education. Moreover, the most discussed topics are how exams will be conducted, how to provide feedback to students, how to ensure exam security, and how to ensure a fair and transparent evaluation. As a matter of fact, the contribution of unattended online exams to overall success is low, cases of cheating are higher, and they are not effective enough (Anderson et al., 2005; Bozkurt & Uçar, 2018).

This study evaluates online exams from a general perspective. The traditional literature review was adopted as the research method in this direction. The information, which is disorganized in traditional literature reviews, is handled as a whole, and a link is established between the topics discussed to create a synthesis in the end (Baumeister & Leary, 1997).

Distance Education

Distance education is continuously increasing its impact on education and training environments. This has caused traditional education applications to be replaced by technology-based online applications (Galante, 2002). Distance education is a form of

learning that is structured independently of the time and place of students, instructors, and curriculum and is structured with a systematic approach (Gunawardena & McIsaac, 2013). In another definition, it is the whole of formal education in which the learner and instructor are in different physical environments, bringing together the learner and instructor with information and communication technologies on a common platform (Simonson et al., 2003). In other words, it can be defined as a learning process in which students benefit and stay away from the learning source regardless of the time and place and where the interaction is carried out with remote and online systems (Özkul & Aydın, 2016).

Distance education is structured learning where students and instructors are separated by place and sometimes by time. It can also be defined as the fastest-growing form of education today. The concept, which was once considered a special form of education using non-traditional education systems, is now becoming an important concept at the center of education. Concepts such as networked learning, connective learning areas, flexible learning, and hybrid learning systems have expanded the scope and changed previous distance education models. Courses developed in the web environment are now regarded as traditional programs that have become a competition for those who want to attend any training with the perspective of "anytime, anywhere" (Gunawardena & McIsaac, 2013).

In the literature, the concept of distance education also appears as distance learning, e-learning, and virtual learning. Simonson et al. (2003) emphasize four basic elements in distance education, which are as follows:

1. Distance education is a formal education conducted by an institution.
2. Instructors and learners are separated from each other in terms of space or time, or both time and place.
3. Education is carried out synchronously and asynchronously using information and communication technologies.
4. Learning Management Systems (LMS) are used.

History of Distance Education

The distance education process, which started with stenography courses by sending letters in the USA, continues to be carried out and developed with virtual classes on the internet and web today (NEA, 2000). In Figure 1, the periods and stages of distance education are shown. In the literature, there are other researchers who evaluate these phases and periods differently (Casey, 2008, Moore & Kearsley, 2011).

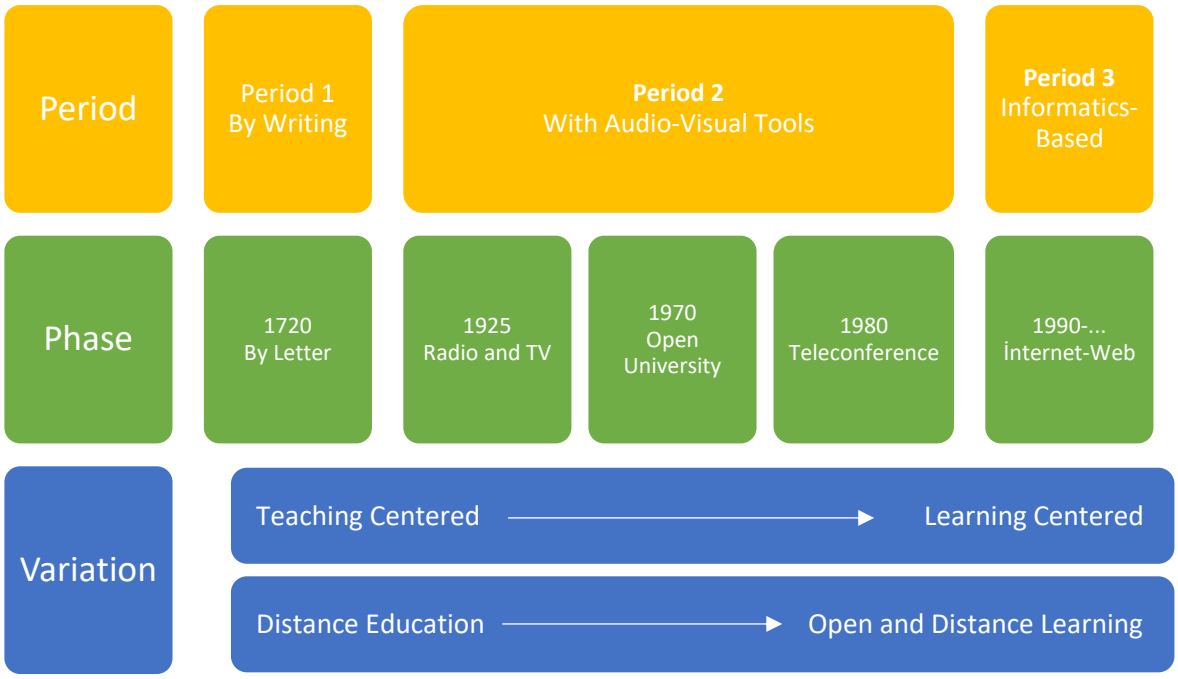

Figure 1. Periods, phases, and variations in distance education (Bozkurt, 2016)

Currently, distance education, which is carried out based on information and communication technologies, has taken a completely different form from its earlier form in the 1990s. One of the most important developments in this regard is synchronous virtual classrooms. Virtual classrooms are environments where instructors and students, who are physically separated, teach their lessons synchronously. Applications such as Adobe Connect, Microsoft Teams, Big Blue Button, and Zoom are the most preferred software with virtual classroom support today. Through such software, courses are taught synchronously, and when necessary,

permissions and arrangements are made, asynchronous use of the course is provided. Many operations (right to speak to students, file sharing, etc.) done in traditional classrooms can also be done in virtual classrooms (McBrien et al., 2009; Schullo et al., 2007).

The worldwide interest and spread of distance education, which is greatly affected by the rapid development of technology, is theoretically attributed to five reasons (Cavanaugh, 2001; Oblinger, 2000), which are listed as follows:

1. Extending access
2. Providing students with flexibility
3. Reducing costs
4. Reaching different markets
5. Appearing in the form of adapting new technologies and methods

Synchronous and Asynchronous Learning

Distance education consists of two learning models: synchronous and asynchronous (Midkiff & DaSilva, 2000). Synchronous distance education is the participation of instructors and students in educational activities from different places simultaneously. In this model, there is a mutual interaction. Training occurs live. In asynchronous distance education, instructors and students participate in educational activities both in different places and in different time periods. In this model, students can benefit from teaching materials whenever they want. A basic comparison of the synchronous and asynchronous models was made in Figure 2 (Margaret, 2022).

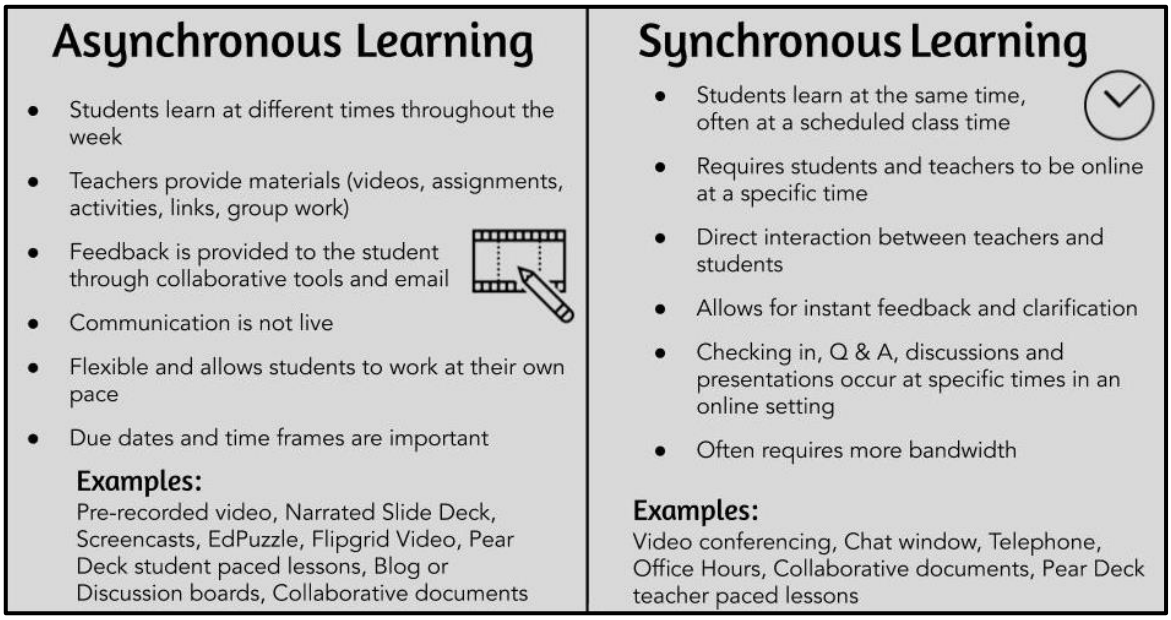

Figure 2. Asynchronous vs. Synchronous Learning

Effective implementation of synchronous and asynchronous training is directly related to when, why, and how to use it. Planning complementary face-to-face meetings together with synchronous methods (video conference, message, etc.) in discussing complex issues could contribute to the effective execution of educational activities. However, the asynchronous model is more effective for discussing complex issues that require time. Virtual environments such as email, discussion boards, and blogs can be used in such cases. Table 1 presents summary information on when, why, and how to use the synchronous and asynchronous learning model.

Table 1. When, why, and how to Use Asynchronous vs. Synchronous E-Learning (Hrastinski, 2008)

	Asynchronous E-Learning	**Synchronous E-Learning**
When?	• Reflecting on complex issues • When synchronous meetings cannot be scheduled because of work, family, and other commitments	• Discussing less complex issues • Getting acquainted • Planning tasks
Why?	• Students have more time to reflect because the sender does not expect an immediate answer.	• Students become more committed and motivated because a quick response is expected.
How?	• Use asynchronous means such as email, discussion boards, and blogs	• Use synchronous methods such as video conferencing, instant messaging, and chat, and complement face-to-face meetings.
Examples	• The students expected to reflect individually on course topics may be asked to maintain a blog. • The students expected to share reflections regarding course topics and critically assess their peers' ideas may be asked to participate in online discussions on a discussion board.	• The students expected to work in groups may be advised to use instant messaging as support for getting to know each other, exchanging ideas, and planning tasks. • A teacher who wants to present concepts from the literature in a simplified way might give an online lecture via video conferencing.

Blended Learning

Recently, the blended learning model has been widely used besides the synchronous and asynchronous learning models. Blended learning is an approach used to combine the strengths of face-to-face and online learning to develop the knowledge and communication skills necessary for success (Lindquist, 2006). This type of learning aims to increase the quality of education by combining traditional education with

technology (Harriman, 2004). A schematic version of blended learning is presented in Figure 3.

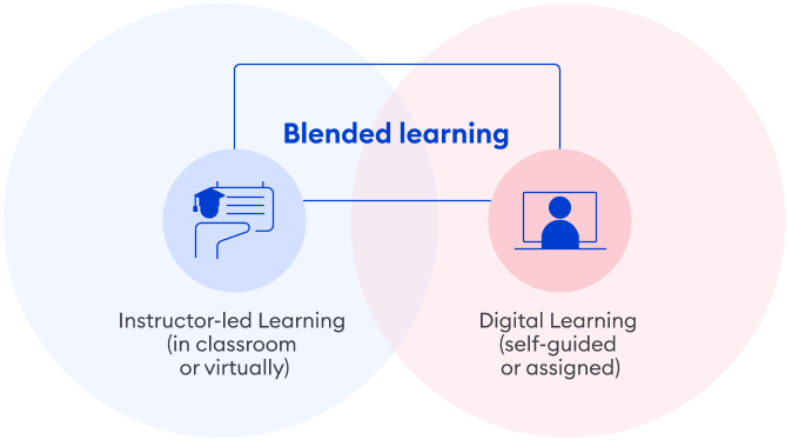

Figure 3. Blended Learning (Kolinski, 2022)

One of the important advantages of distance education is that it offers an adaptable learning environment. In this respect, it is important to consider individual differences regarding learning in distance education and offer learning options that can address individuals' learning styles. Distance education, in which adaptations are made to meet the individual learning needs of each user in line with information such as the individuals' preferences, prior knowledge, attitudes, and skills, is also crucial in terms of assessment and evaluation (İnan et al., 2016).

Component of Distance Education

It is seen that distance education is investigated from different perspectives in terms of components. One of the previous studies was conducted by Demir (2014). According to the researcher, distance education consists of four components. Figure 4 shows the basic components.

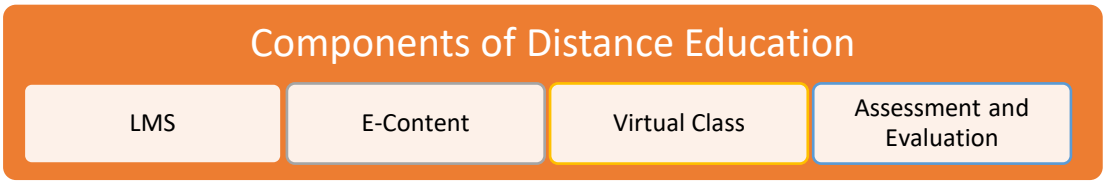

Figure 4. Components of distance education (Demir, 2014)

Assessment and evaluation are also important in distance education, as in traditional face-to-face education, in planning, directing, and measuring the success of education (Demir, 2014). In the context of distance education, assessment and evaluation tools offer more alternatives than traditional assessment tools (Demir, 2014; Simonson et al., 2003). Besides, the fact that instructors and students are in different environments in online exams has brought about reliability and validity discussions (Gül & Doğan, 2011; Karahocagil et al., 2021).

Assessment and Evaluation in Distance Education

Technology, which affects every component of education, has also, directly and indirectly, impacted the assessment and evaluation process. One of the most notable outputs of this effect is that traditional pen-and-paper assessment and evaluation activities are easier and less error-prone through online applications (Bayrak & Yurdugül, 2015). Online assessment and evaluation applications tend to be used increasingly with the rapid development of computer and mobile technologies and the increase in internet connection speed (Başol et al., 2017). Many educational institutions have taken initiatives in this direction on behalf of the sustainability of education for possible force majeure reasons.

Assessment is at the center of the learning process (Baki & Birgin, 2002). Hence, the evaluation of education given is as important as the presentation of education and training in distance education. Here, we come across the concept of assessment and evaluation in distance education. Assessment and evaluation in distance education are

defined as the online evaluation method of educational activities conducted with distance education (Bozkurt & Tekedere, 2013). Online assessment and evaluation are not different from traditional assessment. Assessment techniques used in traditional teaching environments can be easily applied to online assessment environments (Cabı, 2016; Donovan et al., 2007). However, there are some important points to highlight here. One of the biggest mistakes is transferring the pen-and-paper exams to the online environment as they are. Online exams should not be evaluated as in traditional assessment and evaluation tools. Instead, it is important to use assessment tools and techniques appropriate to their nature.

Assessment and evaluation in distance education are categorized into two groups: formative and summative, as in face-to-face education. While formative assessment includes assessment tools such as homework, peer assessment, self-assessment tests, and exam preparation tests, summative assessment consists of final exams, homework, or activities that affect the achievement grade (Karadağ, 2014). All these assessment and evaluation activities are carried out in online environments. These activities offer quite different alternatives for summative evaluation. Another grouping includes formal (quizzes, homework, etc.) and informal (Emails that provide feedback, etc.) evaluation processes (Gunawardena & Lapointe, 2003).

As in all teaching activities, the main function of assessment and evaluation is to bring learning to better levels and increase the effectiveness of teaching (Şimşek, 2011). For this reason, it is critical to conduct an assessment and evaluation with techniques and methods suitable for its purpose. Assessment and evaluation techniques in distance education are discussed under two headings.

1. Traditional assessment and evaluation techniques
2. Alternative (Complementary) assessment and evaluation techniques

The comparison between traditional and alternative assessment and evaluation techniques is given in Table 2.

Table 2. Traditional vs. alternative assessment (Bailey, 1998)

Traditional Assessments	**Alternative Assessments**
One-shot tests	Continuous, longitudinal assessment
Indirect tests	Direct tests
Inauthentic tests	Authentic tests
Individual projects	Group projects
No feedback provided to learners	Feedback provided to the learners
Speeded exams	Untimed exams
Decontextualized test tasks	Contextualized test tasks
Norm-referenced score interpretation	Criterion-referenced score interpretation
Standardized tests	Classroom-based tests

Detailed information on some of the traditional and alternative assessment and evaluation techniques is given below (Atılgan et al., 2019; Bahar et al., 2015; Kutlu et al., 2017; MoE, 2007).

Traditional Assessment and Evaluation Techniques

- **Multiple choice questions:** They consist of a question sentence and a correct answer with more than one distractor for the question.
- **True or false questions:** These are questions in which a statement is true or false according to the available information.
- **Matching questions:** These are the questions that include a list of instructions, a list of statements, and a list of answers to be connected to the statements for matching, and the statements and answers are asked to be matched with each other in accordance with the instructions.
- **Fill-in-the-blank questions:** These are the questions that are asked to write the short sentences or words that are expected to exist in the given expression and that are not written in the blank spaces in the expression.
- **Short answer questions:** These are questions answered with a word, a sentence, or a symbol.

- **Long-answer questions:** These are the questions in which long written answers are collected regarding the statement given in the form of one or more sentences.

Alternative (Complementary) Assessment and Evaluation Techniques

- **Concept maps:** It is a technique based on students' associating their existing knowledge with newly learned information, making connections between information, and expressing them visually.
- **Diagnostic branched tree:** It is a technique in which another true-false question form linked to the chosen answer is presented depending on a question statement given as true-false, and new questions are presented depending on the answers.
- **Word association:** It is a technique in which the words evoked by a keyword presented on a topic within a specified short time are taken as a response.
- **Project:** A detailed study covering achievements on a presented research topic, individually or as a group, with broad research content and long-term and progressive evaluation processes.
- **Drama:** It is the process of displaying a concept or sentence through improvisation or play and restructuring the concept in line with the available information.
- **Demonstration:** This is a technique based on the students' practical presentation and explanation of an event or situation.
- **Structured grid:** It is a technique based on placing the answers to more than one question in a table by the instructor, the answers of which are related to each other, and testing skills such as ordering, linking, associating, and selecting the answers to the questions from the table.
- **Product selection file (portfolio):** This is a technique in which different works carried out by the student on one or more subjects are combined and evaluated in a purposeful, meaningful, and specific order.

In countries such as Turkiye, assessment and evaluation, which is seen as a determining part of education rather than being an integral part of it (Özkan & Turan, 2021) and always a controversial subject, has become even more controversial with its inclusion in distance education (Güvendir & Özkan, 2021). Assessment and evaluation as an important part of the education process cannot be carried out effectively enough in distance education (Ocak & Karakuş, 2022). A reason for this situation is the insufficient level of knowledge about how to perform the online assessment and how to monitor student performance (James, 2016). To overcome this deficiency, the determination of learning goals and the determination of criteria to measure them are the first elements (Robles & Braathen, 2002). Another is distrust of online exams.

Online Exams

Online exams, which are frequently used in distance education activities, are system components in which learners answer various questions prepared by an instructor on a platform (generally LMS). They can be taken anywhere and anytime via any smartphone, tablet, or computer with internet access.

Student achievement in exams is accepted as one of the important indicators of education quality, which is affected by many factors. One of the most important of these factors is the exam environment. This is a critical factor for student performance. (Duart, 2000). The other factor is the assessment method. Brown et al. (1999) state that the assessment method significantly affects student learning. DeSouza and Fleming (2003) suggest that students who took an online exam were more successful than students who took the same exam in print in the classroom, thanks to immediate assessment and feedback. However, there are different arguments on this topic. Some studies have indicated that the exam environment has no effect on academic achievement (Solak et al., 2020; Yağcı et al., 2015).

Online exams have brought some negative effects as well as many positive effects. One of the most fundamental issues about online exams is exam security (Karahocagil et al., 2021; Solak et al., 2020). Many researchers suggest that online exams have

validity and reliability problems, which is a major obstacle to fair evaluation (Güvendir & Özkan, 2021; Rossiter, 2020). There are also studies in the literature claiming the opposite (Shraim, 2019). Tümer et al. (2008) consider online exams to be at least as successful as pen-and-paper face-to-face exams and argues that they not only facilitate the teaching process but also increase the quality. Shraim (2019) claims that online exams are more useful on the conditions that necessary precautions should be taken.

The biggest criticism of online exams is that they are suitable for academic irregularities such as cheating and plagiarism, as the exams are not under any supervision. There appear to be some studies confirming this concern. As a matter of fact, Rossiter (2020) revealed that academic irregularities in online exams due to the COVID-19 epidemic were approximately 40% more than the previous year. Another study suggested that the probability of cheating in online exams is four times higher than that in face-to-face exams (Watson & Sottile, 2010). Another criticism is of authentication. Online exams are found to be insufficient for verifying students' identifications (Flior & Kowalski, 2010).

Positive Effects of Online Exams

Knowing the positive effects of online exams on students and instructors is among the important factors in the effective execution of assessment and evaluation. Many studies have reported the positive effects of online exams (Anderson et al., 2005; Dommeyer et al., 2004). Zakrzewski and Bull (1998) state that online exams have three important advantages: time independence, place independence, and instant feedback. Some of the positive effects of online exams used in the distance education process for both students and instructors are given below:

1. Cost and time savings (Callı et al., 2003)
2. Archiving and reuse of question banks (Callı et al., 2003)
3. Minimization of assessment errors (Solak et al., 2020)
4. Obtaining objective results (Anderson et al., 2005)
5. Instant announcement of results by administering exams easily (Kuhtman, 2004; Yağcı, 2012)

6. A rich display of information with the integration of multimedia elements into exams (Liu et al., 2001; Luecht, 2001)
7. Facilitating the work of the instructors (Dommeyer et al., 2004)
8. The opportunity to always access and apply the exams (Başol et al., 2017)
9. Writing of comprehensive question banks (Natal 1998)
10. Suiting to new teaching approaches (Gül & Doğan 2011)
11. Providing variety and originality for assessment (JISC, 2010)
12. Follow-up of the learning process and correcting the misconceptions thanks to the instant feedback (Başol et al., 2017)
13. Being supportive of learners with latency and difficulty or incompleteness (Başol et al., 2017)

Negative Effects of Online Exams

In addition to the positive effects of online exams, the negative effects and disadvantages should be well studied. Considering the existing disadvantages when instructors prefer online exams will also prevent potential problems. Some negative effects and disadvantages of online exams are listed below:

14. It is necessary to have sufficient information technology equipment and internet infrastructure (Başol et al., 2017; Marriott & Teoh, 2019)
15. For some exams, it takes time to prepare the questions and the question bank online (Çiğdem & Tan, 2014)
16. Setting up, operating, and managing the online system requires significant budgets and time (Debuse & Lawley, 2014; Dommeyer et al., 2004; Wirth & Klieme, 2003)
17. Introducing the online system to users may require additional effort and time (Debuse & Lawley, 2014)
18. Although various technologies are used to monitor exam takers and prevent cheating in the online environment, the process of surveillance and exam

security is very challenging (Duart, 2000; Kumar & Rathi, 2019; Solak et al., 2020)

19. Momentary malfunctions may occur in the system, the exam process may be interrupted, and exams may remain incomplete (Marriott & Teoh, 2019)
20. Students had to control non-exam skills such as screen reading, using time, and preparing an exam environment at home rather than using a pen and paper. They must deal with the negativities related to the conduct of the exam rather than the content of the exam (Ocak & Karakuş, 2022).

Figure 5 summarizes the advantages and disadvantages of online exams.

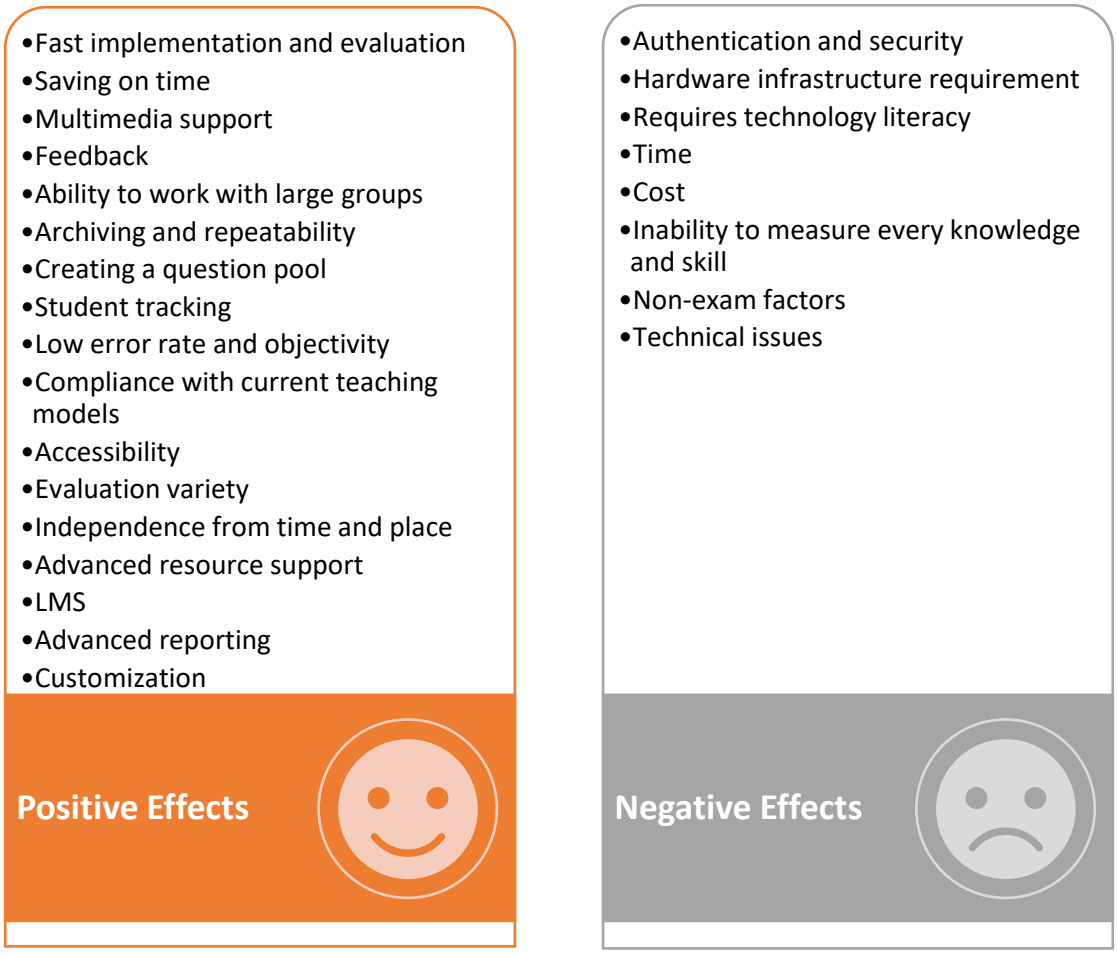

Figure 5. Positive and Negative Effects of Online Exams

Academic Misconduct (Copying and Cheating)

An issue that educators complain about the most in online exams is academic misconduct. In the literature, numerous studies have dealt with this concern (Alwi & Fan, 2010; Özen, 2016) and found the justification for these concerns (Ebaid, 2021; Hillier, 2014; Lanier, 2006; Rossiter, 2020; Watson & Sottile 2010). To this end, King and Case (2014) showed that 74% of students believe that cheating in an online exam is very easy or somewhat easy. Another study showed that students' ability to access electronic resources quickly with technology positively affects their attitudes toward cheating in online environments (Khan & Balasubramanian, 2012). In that study, 37.5% of the students admitted that they cheated in the exams made with paper and pencil, and in online environments, this rate rose to 78%. Student behaviors that threaten security in online exams can be listed as follows (Flior & Kowalski, 2010; Yılmaz et al., 2022):

1. Switching to another browser during the exam
2. Opening another browser simultaneously
3. Using printed sources at the time of the exam
4. Benefitting from other devices along with their devices
5. Other people taking the exams instead of themselves
6. Using fake camera image software

The above-mentioned academic misconduct attracts more attention since instructors and students are in different environments (Ramu & Arivoli, 2013). As a matter of fact, cheating and plagiarism, which are described as academic irregularities, are not new concepts brought about by distance education and online exams. When such academic irregularities are evaluated more generally, they are undesirable situations that have existed and will continue to exist in education (Lin & Wen, 2007).

Some measures to be taken could help prevent possible academic misconduct. These measures can be categorized into two:

1. Measures to be taken with an online exam design
2. Technology-assisted measures

The online exam design is more important than technology-assisted measures. Such negativities are less experienced in online exams prepared by instructors effectively and carefully. In addition to this, screen sharing can be prevented, questions come sequentially, one entry right, and time restriction can be suggested as other measures (Guvendir & Özkan, 2021). In addition to multiple-choice test-type evaluations, alternative evaluations, such as product files, can be included in the process (Robles & Braathen, 2002). Hence, various performance evaluations, including exams, should be used to ensure quality in distance education (Pekcan & Toraman, 2022). Such measures can contribute to the solution of problems that may occur in the process.

Balta and Türel (2013) propose using performance-oriented assessments to prevent academic misconduct. In this direction, they recommend that the assignments be designed in stages, not all at once. The gradual requesting of homework and projects prevents unethical behaviors and ensures that the instructor has a great command of the assignment. Additionally, this application offers an opportunity for the instructors to get to know the students. Another similar suggestion is that online exams are not conducted as a single end-of-term exam (summative assessment) but as a formative assessment to measure learning throughout the process (Shraim, 2019).

Improving the hardware, software, and technology infrastructure to ensure exam security in online exams is among the solution suggestions (Al-Shalout et al., 2021). One of the biggest problems with online exams is that students involve other people in exams instead of themselves. Kınalıoğlu and Güven (2011) claim that this problem can be prevented with systems with video, camera, or face recognition. However, technological measures such as these cannot be used by all institutions due to their high costs. At this point, open-source software can be used (Proctoring software, etc.). According to Gunasekaran et al. (2002), online exams should be supervised and face-to-face to avoid high costs. However, it will not be a practical application in force majeure situations such as COVID-19 or when it requires learners to be in different environments. In addition, this approach is not suitable for distance education. Although studies are conducted in the context of authentication in the literature (Hylton et al., 2016; Kumar & Rathi, 2019), it does not seem to have widespread use.

A disadvantage of supervised online exams used for authentication is that students must have the hardware, internet infrastructure, and technology usage skills. However, rural regions have weaker technological infrastructure than central regions, which might create victimization for the student and cause inequality of opportunity. Another problem is that students from lower socioeconomic levels may not have the computer, smartphone, or even the internet required by the examination system. Additionally, it is another problem that the possible system or user-related technical problems cannot be solved instantly. It is of great importance for a smooth assessment and evaluation that the institutions that decide on video verification in this regard produce alternative solutions at these points.

Conclusion

Distance education has started to be used widely, especially after the COVID-19 pandemic, which emerged in the world in 2019 and caused a break in face-to-face education almost worldwide. In this process, assessment and evaluation activities, which are indispensable components of education, were also affected, and face-to-face exams began to be held online. During this period, online exams were used extensively. Although online assessment and evaluation methods, which offer more alternatives than the assessment and evaluation methods used in face-to-face education, provide many conveniences and opportunities, such as multidimensional evaluation and time and space independence in group work, they have also brought some negativities. Some of the primary disadvantages of online exams include issues such as hardware, software, and internet infrastructure requirements, the time-consuming nature of preparing questions, budget and time requirements for managing and operating online systems, challenges in the prevention of cheating in online exams exam, the difficulty of ensuring the security of the system, momentary malfunctions that may occur in the system and interruption of the exam process, are a requirement of more preparation than face-to-face education.

The main advantages of online exams, which is one of the online assessment and evaluation methods, can be summarized as cost and time savings, archiving and question banks, minimum measurement errors, objective results, easy application, fast results, use of multimedia elements, and tracking of student achievement. As a result, efforts to minimize the disadvantages of online exams, which continue to become widespread, should be continued, and it should be used as an assessment and evaluation method with a design suitable for the content of education, considering the advantages it provides.

The increase in the number of scientific research and projects to be carried out in the context of online assessment and evaluation is of great importance in revealing the current situation. Finally, it is clearly seen that online exams could be widely used in the future. For this reason, it is vital that all stakeholders in education prepare themselves in this direction and adapt to such technologies.

Note

A part of this study was presented at the International Conference on Science and Education (IConSE), which took place on November 15-18, 2022 in Antalya, Turkey and published in the abstract book.

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