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PAPER

The Effectiveness of E-Learning Usage among University Students in the Kingdom of Saudi Arabia

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ABSTRACT

Educational institutions have recently embraced e-learning systems, reflecting a modern trend in education that positively impacts the learning process. However, limited studies have investigated the impact of e-learning on higher education students and teaching staff during the COVID-19 pandemic, such as their experiences, lack of information on teaching and learning, and attitudes. This study, therefore, aims to fill this gap by evaluating the effectiveness of e-learning in university education. Employing a descriptive-analytical method, the study utilized a questionnaire to collect data from a sample of 5,876 students and 272 teachers at Imam Abdulrahman Bin Faisal University in Dammam, Eastern Province, Saudi Arabia. The results indicate that student satisfaction with e-learning is neutral, whereas faculty satisfaction is high. Additionally, faculty members possess the necessary knowledge and skills for e-learning. Given the variation in previous studies' findings, the study recommends conducting further study to enrich the theoretical literature.

KEYWORDS

electronic assessment tools, electronic tests, satisfaction, students, teaching staff, universities

1 INTRODUCTION

The COVID-19 pandemic significantly impacted educational systems worldwide, prompting rapid technological advancements and a shift towards e-learning. This technological progress has encouraged many institutions to expand their interests and adopt modern technological systems [1–2]. Different educational institutions have sought to harness the potential of these technological systems and integrate them into the learning process to attract and motivate learners, stimulate students' interest in learning and their engagement, provide a suitable learning environment in terms of both quantity and quality, enhance various educational practices, and develop the educational process [3–9].

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Following the spread of the novel coronavirus (COVID-19), educational institutions had to resort to remote teaching and learning as a safe and feasible option in such crises to meet the rapid changes occurring in the learning environment [10–12]. E-learning is defined as a "method of learning that employs electronic media, including computers, networks, and multimedia with sound, images, graphics, electronic libraries, and internet portals, to establish communication between teachers and learners and learners and schools, allowing learners to choose the place, time, and duration of learning" [13]. E-learning relies heavily on modern technological means and tools, such as computers, the internet, satellites, and interactive videos, among other things, to deliver educational material. Notably, studies [7] have indicated that the effective use of e-learning in the educational process has become a solution for learning problems, yielding significant returns, saving time and effort, and enabling the achievement of various educational objectives. Therefore, e-learning has become a strategic option in educational institutions and an essential requirement for achieving desired learning and educational goals.

Numerous studies have concluded that e-learning has benefited the higher education community and provided them with opportunities to enhance the teaching and learning process [14]. For instance, studies [15–16] confirmed that e-learning helps students access teachers and teaching materials easily. [14] also highlighted that e-learning helps students become self-directed learners and learn from anywhere at any time. [17–18] also supported the idea that e-learning positively impacted students, offering them time flexibility when attending lectures and accessing necessary information. In conclusion, e-learning provides multiple advantages for all facets of the educational process, benefiting learners, teachers, and the educational process itself. It provides flexibility and efficiency in learning by saving time and effort, ensuring equal learning opportunities, solidifying knowledge, supporting continuous assessment, and maintaining the quality of the learning environment [7].

Despite the benefits of e-learning during the COVID-19 pandemic, several issues and challenges were also highlighted, particularly for students and teachers [19–21]. These challenges included internet connection issues, a lack of adequate e-learning resources and infrastructure, a lack of technical and training support, and teachers' and students' beliefs and perceptions regarding using technology [19–23]. In addition, challenges concerning physical and health problems represent a significant issue for e-learning during the pandemic [24]. The emerging e-learning literature also identifies several pedagogy issues, such as getting knowledge on a theoretical basis as well as online assessment, which are related to objective questions [14].

Although studies suggest that online learning is one of the most important technological innovations that has led to a transformation in the traditional approach to learning, the COVID-19 pandemic had an overwhelming effect on educational institutions, and Saudi Arabia was no exception as the online learning system was implemented. For instance, several benefits and challenges were observed, such as a comprehensive curriculum in online design [25–27], a lack of online teaching skills, inadequate technical support, students without reliable internet access or technological equipment struggling to participate in e-learning activities, and some courses being difficult to understand [28–32].

Several studies have addressed the benefits and challenges of e-learning implementation. A study was conducted by [23] to identify e-learning challenges

experienced by students in the outbreak of the COVID-19 pandemic. The results revealed that a combination of face-to-face and online approaches must be available for students. Another study analyzing the benefits and challenges of e-learning during the outbreak of the COVID-19 pandemic has been presented in [14]. A questionnaire was applied to a sample of 155 students and teachers at the University of Benghazi. The results revealed that e-learning contributes to raising students' educational levels. On the other hand, the result demonstrated that several challenges were highlighted, such as the increased burden on students, the lack of internet in the faculty to apply e-learning, and the lack of experience of students with e-learning techniques.

According to Khudair and Abdelhamid [13], e-learning plays a role in saving time and effort, improving students' academic achievements, and enhancing the learning environment for both students and teachers by providing diverse learning methods. These methods empower students to take responsibility for their learning, consult various knowledge sources, and efficiently achieve learning goals while keeping abreast of educational developments [31, 32]. Additionally, Al-Rawashdeh et al. [33] found that e-learning positively contributed to enhancing communication and learning among university students in the United Arab Emirates. Another study analyzed online learning during the outbreak of COVID-19, which was introduced in [34]. A questionnaire was applied to a diverse sample of 690 students at a mid-size university in the northeastern United States. The results revealed that students preferred online asynchronous classes, which offer greater flexibility in managing multiple responsibilities.

Although previous studies have revealed that the implementation of online learning facilitated students' learning, such conclusions have inspired studied to investigate teachers' and students' perceptions and beliefs about online learning. Most of these studies focused on students' perceptions, but some were conducted among teachers to determine their perceptions of online education. Furthermore, studies on attitudes toward using online education remain few and inconclusive. The inconclusive results need attention from studied to understand faculty members' perceptions of online learning environments. Therefore, this study investigates the effectiveness of e-learning among university students and faculty members in the Kingdom of Saudi Arabia. This study contributes to the literature on the online learning environment in the university context, which has not been widely explored.

1.1 The problem of the study

Although the education sector in Saudi Arabia receives considerable attention and funding, and great efforts have been made to overcome the consequences of COVID-19, students often have concerns regarding interruptions in certain areas, internet connectivity, logging in to the network and taking courses, and a lack of resources to access reports [35–37]. In response to the impact of COVID-19 on learning, the Ministry of Education in Saudi Arabia has developed a policy to facilitate online education [38] by providing universities with the necessary resources and platforms, such as the Blackboard platform, to support online classrooms and learning [39].

Furthermore, limited studies exist regarding the impact of online learning on higher education students and teaching staff following the COVID-19 pandemic.

The gap in the literature includes students' and teachers' experiences and perceptions of the implementation of online learning during the pandemic [40–42]. Therefore, to expand the scope of previous studies and bridge the gap in the literature, this study investigates students and teaching staff's experiences and perceptions of the e-learning systems implemented at Imam Abdulrahman Bin Faisal University in Saudi Arabia during the COVID-19 pandemic.

1.2 Study questions

The study questions were as follows:

- What is the perceived effectiveness of e-learning during the COVID-19 pandemic among students at Imam Abdulrahman Bin Faisal University?
- How satisfied are students and faculty members with the experience of e-learning in the process of education and learning?
- What are the main challenges faced by students and faculty members in utilizing e-learning during the COVID-19 pandemic?

1.3 Study objectives

The current study aims to assess the effectiveness of e-learning during the COVID-19 pandemic from the perspective of students and faculty members at Imam Abdulrahman Bin Faisal University in the Kingdom of Saudi Arabia. The study also aims to determine the level of satisfaction among students and faculty members regarding their experience with e-learning in the process of education and learning at the university. Finally, the study aims to identify the main obstacles and challenges faced by students and faculty members at the university when utilizing e-learning during the COVID-19 pandemic.

1.4 Importance of the study

E-learning has become a new and advanced method of education and learning, not only to cater to the needs of individuals who cannot engage in traditional education due to their circumstances but also to spread knowledge more widely and facilitate education and learning. E-learning in Saudi universities provides various interactive electronic systems, advanced technological tools, and specialized software to elevate university programs to a high level of efficiency and effectiveness among the general population. We cannot deny the role that e-learning plays in elevating individuals' levels across cultural, scientific, and social aspects. It also contributes to addressing potential deficiencies in the process of learning and education, among other possibilities.

As a result, e-learning has gained widespread and significant success in various educational institutions around the world. Students' current experience with education is so rich that it deserves deep scientific attention and study; it aims at maximizing the benefits of this method of education and learning. This is essential for integrating e-learning into the heart of the educational process and reaping its

fruitful outcomes. The fundamental importance of this study lies in its recognition of these aspects.

2 STUDY METHODOLOGY

This study deployed a cross-sectional design and quantitative approach to evaluate the experience of remote education and learning, which is different from other approaches [43]. The study approach was designed to understand not only the strengths and weaknesses of the e-learning system but also its adoption by selected university students and teaching staff who have already integrated e-learning services, which could help to explain the numeric strength of this impact [44–45]. Furthermore, the chosen methodology necessitated specifying the study environment/context and the study population, in addition to identifying the tools used for data collection and the procedures employed for analysis. This study was conducted throughout the second semester of the academic year 1440–AH (2019–2020 CE). Based on the quantitative study design, the study involved collecting data in numerical format for quantitative analysis [46].

2.1 Sample and data collection

The current survey study was conducted within the Preparatory Year Deanship and its supporting studies. The study population consisted of students and teachers involved in the processes of learning and teaching during the second semester of the academic year 1441 AH (2019–2020 CE). Given the anticipated participation of students and teachers in the survey-based study, it was evident that non-random and non-probabilistic sampling methodologies should be employed. This method is traditionally referred to as purposive sampling, which involves selecting samples from the entire population. Consequently, it falls within the purposive sampling approach. The advantages of using this sampling method include enabling the formation of deep and comprehensive insights into the problem(s) under investigation. Determining the study sample necessitates highlighting its specific characteristics, which in this context encompass the shared experiences of students and their instructors, as well as their behaviors towards the processes of remote e-learning and teaching. The study included a total of 5,876 students (1,372 males and 4,504 females) and 272 teachers (110 males and 162 females). Tables 1 and 2 illustrate the sample characteristics.

2.2 Data collection and analysis tools

This survey study relied on utilizing a questionnaire as a means of collecting empirical data. Questionnaires, in general, are considered one of the most fundamental study tools for understanding people's thoughts, experiences, and perspectives [47]. Accordingly, two distinct questionnaires were developed in both Arabic and English—one targeted at students of both genders and the other aimed at teachers of both genders as well. The quantitative data was collected using predominantly closed-ended questions. It should be noted that the questionnaires have been through several validation stages. After the studied had finished the questionnaires,

they were given to three experienced consultants. These consultants were selected based on their professional expertise and abilities to evaluate the questionnaire's content. They asked for some modifications, which were taken into consideration, and the necessary modifications were made. Following this stage, the studied conducted a reliability test using Cronbach's alpha value, which was found to be 0.83. As for each participant group, the questionnaire in its first section aimed to collect some basic personal data from the participants (students: gender, study track, and English language proficiency; teachers: gender, job position, professional experience, and department).

In the other sections of the questionnaire, a five-point Likert scale was used to measure variations—such as responses indicating agreement, quality, satisfaction, and frequency—regarding the experience of remote learning and teaching. The purpose of the last part, which included open-ended questions (three for students and two for teachers), was to obtain additional comments and suggestions regarding this experience from both participant groups in the survey. Furthermore, some documents and reports from the academic departments within the deanship were analyzed, focusing on the challenges and difficulties they encountered during this pandemic. For analysis purposes, statistical procedures were applied to the collected data to determine means and percentages.

Table 1. Personal characteristics of the students

Variables	Categories	Frequency	Percentage
Gender	Male	1.372	23.3
	Female	4.504	76.7
Tracks	Health	966	16.4
	Science	2.567	43.7
	Engineering	633	10.8
	Humanities	1.710	29.1
Total		5.876	100

Table 2. Personal characteristics of the instructors

Variables	Categories	Frequency	Percentage
Gender	Male	110	40.4
	Female	162	59.6
Department	Science	88	32.4
	Computer	30	11
	English	73	26.8
	Self-Dev	65	23.9
	Islamic	16	5.9
Total		272	100

3 STUDY RESULTS

3.1 Students' experience with e-learning

Learning environment: The results of the student survey regarding the evaluation of the learning environment indicated neutrality, with a value of 2.86, as shown in Table 3.

Table 3. Students' evaluation of the learning environment

No.	Item	Average	Evaluation
1	I prefer using the e-learning environment over the classroom environment to comprehend scientific material.	2.53	Neutral
2	E-learning is more suitable for me when it comes to comprehending scientific material.	2.43	Neutral
3	Communicating with a faculty member is easier in the case of e-learning.	2.95	Neutral
4	I feel interaction and engagement through the e-learning environment compared to the classroom.	2.50	Neutral
5	My technical skills are sufficient for efficient learning using e-learning methods.	2.52	Neutral
6	The Blackboard learning system is functioning efficiently and without interruption during the current period.	2.89	Neutral
7	The e-learning environment is characterized by flexibility and encouragement for self-learning.	3.07	Agree
8	E-learning is more enjoyable than traditional learning methods.	2.69	Neutral
9	I prefer collaborating with my peers through e-learning more than the traditional method.	2.65	Neutral
10	I prefer integrating e-learning and traditional methods in the classroom environment.	3.39	Agree
General Average		2.86	Neutral

Note: Rating scale: (0–0.99) Strongly Disagree, (1–1.99) Disagree, (2–2.99) Neutral, (3–3.99) Agree, and (4–4.99) Strongly Agree.

The survey results also indicated the satisfaction of faculty members with the e-learning environment, as shown in Table 4. The opinion survey averages ranged from 3.06 to 4.23, with an overall average of 3.43. Faculty members strongly agreed with the statement, "I have sufficient technical skills to learn effectively using e-learning methods," which received the highest satisfaction rating with an average of 4.23.

Table 4. Faculty members' evaluation of the learning environment

No.	Item	Average	Evaluation
1	I prefer online learning because it's more suitable for delivering scientific material.	3.12	Agree
2	Communicating with the student is easier through online learning.	3.21	Agree
3	I feel more comfortable in the online learning environment.	3.12	Agree
4	The Blackboard system provides an interactive learning environment.	3.76	Agree

(Continued)

Table 4. Faculty members' evaluation of the learning environment *(Continued)*

No.	Item	Average	Evaluation
5	My technical skills are sufficient for efficient learning using e-learning methods.	4.23	Strongly Agree
6	The Blackboard learning system is functioning efficiently and without interruption during the current period.	3.57	Agree
7	The Blackboard system helps improve the teacher-student relationship during course instruction.	3.41	Agree
8	The Blackboard system makes it easier for the teacher to deliver the course content.	3.59	Agree
9	The teaching methods through Blackboard increase students' motivation to learn.	3.06	Agree
10	The use of Blackboard tools focuses on student-centered learning.	3.44	Agree
11	The use of Blackboard enhances collaborative teamwork.	3.18	Agree
General Average		3.43	Agree

Note: Rating Scale: (0–0.99) Strongly Disagree, (1–1.99) Disagree, (2–2.99) Neutral, (3–3.99) Agree, and (4–4.99) Strongly Agree.

3.2 Virtual classrooms

The results of the student opinion survey regarding online learning platforms showed that 84% of the students prefer using Zoom, which is a higher percentage compared to other platforms such as Microsoft Teams (60%), Blackboard (54%), and Blackboard Ultra (54%). Figure 1 illustrates the results.

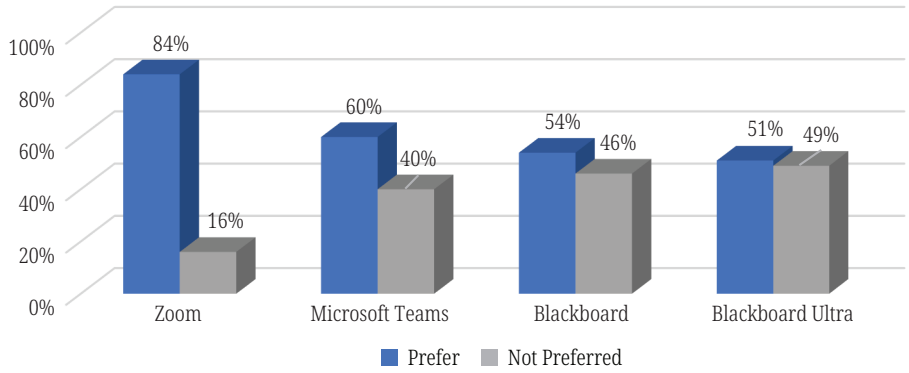
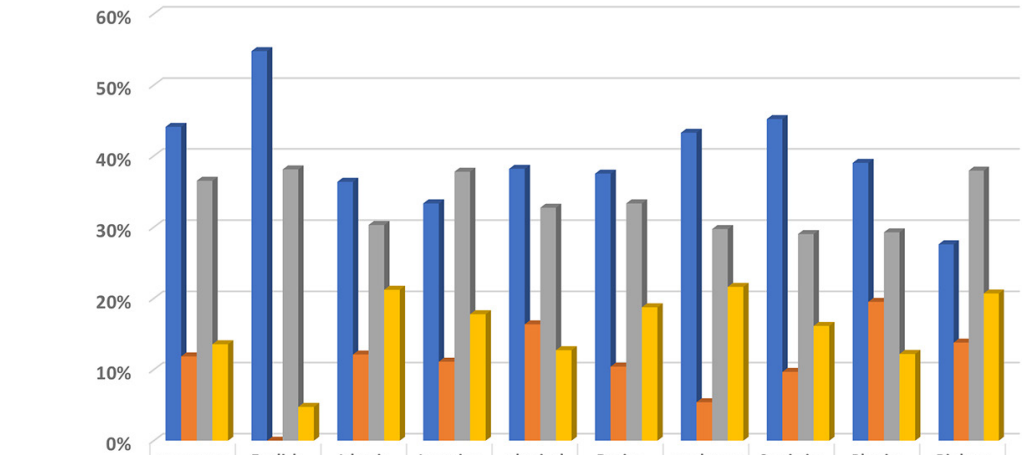


Fig. 1. Students' preferred platform

The opinions of the faculty members aligned with those of the students in most courses (Computer Science, English, Islamic Education, Mathematics, Physical Education, Statistics, and Physics), as illustrated in Figure 2. The Zoom platform was preferred over other learning platforms. However, faculty members who taught courses in learning skills and biology preferred Blackboard primarily. Across all classes, faculty members agreed that Microsoft Teams was the least preferred platform.



	computer	English	Islamic education	Learning Skills	physical education	Design basics	mathematics	Statistics	Physics	Biology
zoom	44%	55%	36%	33%	38%	38%	43%	45%	39%	28%
Microsoft Teams	12%	0%	12%	11%	16%	10%	5%	10%	20%	14%
blackboard	37%	38%	30%	38%	33%	33%	30%	29%	29%	38%
Blackboard Ultra	14%	5%	21%	18%	13%	19%	22%	16%	12%	21%

Fig. 2. Preferred platform among faculty members

3.3 Training and development

The faculty opinion survey on e-learning skills revealed high satisfaction among members. According to the rating scale in Table 5, the average rating was 3.9, indicating an overall "very good" assessment. Most members expressed contentment with their e-learning abilities. The average scores of the items ranged from 3.7 to a very good rating in the item related to selecting the time for training sessions and 4.1 to an excellent rating in the item related to the trainer's interaction with participants' questions. The results of this study indicate that faculty members at the university possess the fundamentals of learning and the technological skills teachers should have.

Table 5. Faculty member training and development skills

No.	Item	Average	Evaluation
1	The trainer in terms of their knowledge and familiarity with the training subject.	4.07	Excellent
2	The trainer's management of the session.	3.97	Very Good
3	The trainer's handling of participants' questions.	4.11	Excellent
4	The trainer's ability to communicate and interact with trainees.	3.92	Very Good
5	The level of discussion facilitated by the trainer.	3.88	Very Good
6	The trainer's experience in dealing with remote platforms.	3.97	Very Good
7	The trainer's organization and time management during the session.	3.97	Very Good
8	The selection of training session timings.	3.76	Very Good
9	The content of the training material.	3.86	Very Good
General Average		3.94	Very Good

Note: Rating Scale: (0–0.99) Poor, (1–1.99) Fair, (2–2.99) Good (3–3.99) Very Good, and (4–4.99) Excellent.

3.4 The extent of applying the skills and knowledge by the faculty member in the educational process through e-learning

The faculty members' opinion survey results regarding the skills and knowledge they possess about e-learning indicate their agreement on their ability to apply what they have learned during e-learning training, as shown in Table 6 below. The faculty members strongly agreed with all the statements, with an overall average of 4.16. Through Statement 4, the faculty members also recommended training courses for their colleagues in other places.

Table 6. Skills and knowledge applied by faculty members during e-learning

No.	Item	Average	Evaluation
1	Alignment of the training with your job objectives.	4.01	Strongly Agree
2	Your ability to apply what you've learned in the instructional process.	4.21	Strongly Agree
3	The contribution of what you've learned to the development of specific skills that impact your success in your workplace.	4.24	Strongly Agree
4	Your recommendation for training courses to your colleagues in other locations.	4.18	Strongly Agree
General Average		4.16	Strongly Agree

Note: Scale of Assessment: (0–0.99) Strongly Disagree, (1–1.99) Disagree, (2–2.99) Neutral, (3–3.99) Agree, and (4–4.99) Strongly Agree.

3.5 Services provided to students

Students expressed their satisfaction with the remote services offered in their preparatory year during the COVID-19 pandemic. The averages for student satisfaction in this regard ranged from 3.03 to 3.85, with an overall average of 3.37, as shown in Table 7. This finding is attributed to the educational and developmental strategies adopted by the university, which increased the use of technology in the university environment, thereby facilitating students' access to the electronic services they needed. In addition, the university held training courses for students to inform them about what electronic services the institution offered and how to use them. This significantly contributed to enhancing students' ability to utilize all electronic services provided by the university.

Table 7. Satisfaction level of preparatory year students with the provided services

No.	Item	Average	Evaluation
1	General assessment of the e-learning system "Blackboard."	3.19	Satisfied
2	Ease of use of the "Blackboard" system?	3.85	Satisfied
3	Speed of loading and browsing the Blackboard system from within the university?	3.24	Satisfied
4	Speed of loading and browsing the Blackboard system from outside the university?	3.53	Satisfied
5	Overall assessment of the experience of online learning during the COVID-19 pandemic?	3.03	Satisfied
6	Experience of in-person classes at the university?	3.72	Satisfied

(Continued)

Table 7. Satisfaction level of preparatory year students with the provided services *(Continued)*

No.	Item	Average	Evaluation
7	Experience of virtual classes during the COVID-19 pandemic?	3.04	Satisfied
8	How effectively do faculty members manage online learning?	3.30	Satisfied
9	Level of support received from faculty members?	3.44	Satisfied
General Average		3.37	Satisfied

Note: Rating Scale: (0–0.99) Very Dissatisfied, (1–1.99) Dissatisfied, (2–2.99) Neutral, (3–3.99) Satisfied, and (4–4.99) Very Satisfied.

3.6 Students' preferred teaching method for courses

In courses such as English, mathematics, physics, chemistry, drawing, and physical education, students preferred a combination of both traditional and electronic learning methods, but the conventional method was used alone for courses on self-development and Islamic education. Finally, students preferred not to limit themselves to the electronic learning method in all courses, as indicated in Figure 3. This finding could be explained by students' preferences for teaching methods and by the fact that all participants in the study sample were first-year university students who may have preferred traditional lectures because they are the most used method in schools. Therefore, students' preferences for teaching methods might differ based on their levels of experience and knowledge of using e-learning tools.

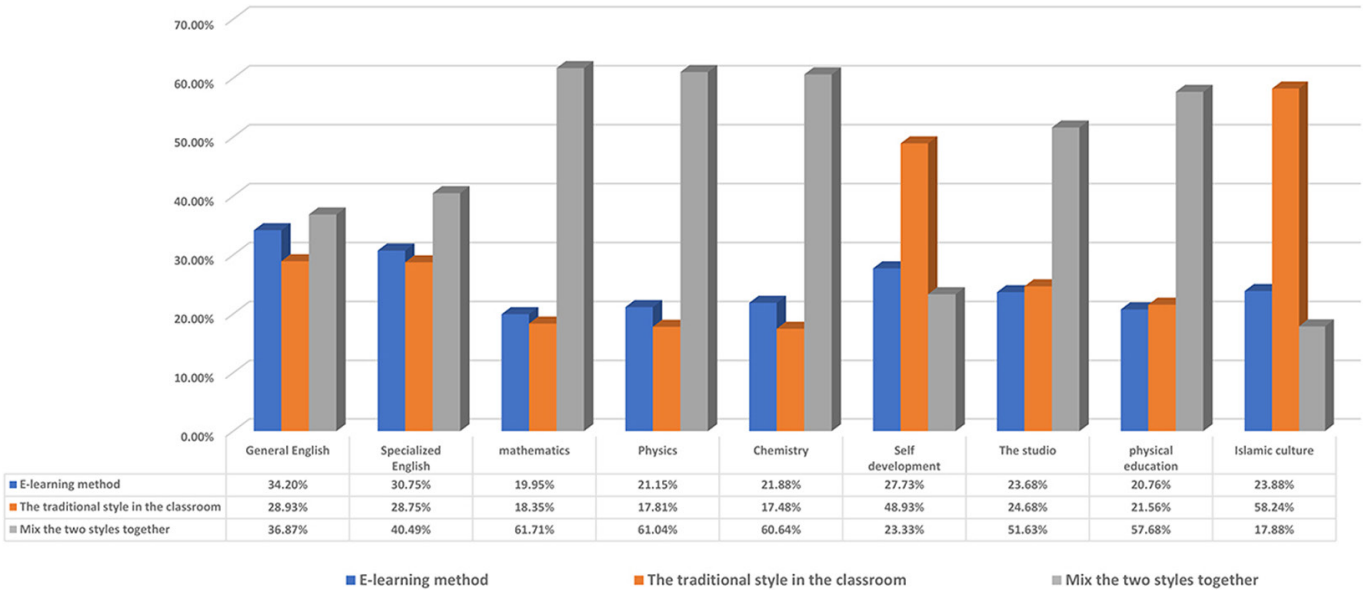


Fig. 3. Preferred teaching method by students for courses

3.7 E-learning tools

The results revealed that students were satisfied with using most of the tools employed in e-learning, as indicated in Table 8. The average student satisfaction rating overall was 3.6, which is considered high. The items related to online assignments

and electronic exams received high satisfaction ratings. In contrast, the items concerning recorded lectures, open educational resources provided by the university, and discussion sessions received lower satisfaction ratings. The rest of the items obtained high satisfaction ratings.

Table 8. Students' use of e-learning tools in courses

No.	Item	Average	Evaluation
1	Virtual classrooms	3.81	High
2	Recorded lectures	2.83	Low
3	Educational materials within the course	3.58	High
4	Open educational resources provided by the university	3.11	High
5	Discussion forums	2.79	Low
6	Assignments	4.38	Very High
7	Course announcements page	3.82	High
8	Online quizzes/exams	4.48	Very High
General Average		3.60	High

Note: Rating Scale: (0–0.99) Not used, (1–1.99) Very low, (2–2.99) Low, (3–3.99) High, and (4–4.99) Very high.

3.8 Overall satisfaction level of students with the e-learning experience

The results of the student opinion survey regarding their satisfaction with the e-learning experience showed that 19.85% of preparatory year students are very satisfied with their e-learning experience in the Preparatory Year and Supporting Studies Deanship, 15.99% are satisfied, 9.26% are neutral, and 12.59% are accepted. In comparison, 42.31% of students felt a need for improvement, as shown in Figure 4. It is possible to attribute this result to the fact that some students were new to the e-learning experience and initially preferred traditional lectures, the more commonly used methods in schools. Therefore, their responses might have been influenced by their experience using technological tools in the learning process.

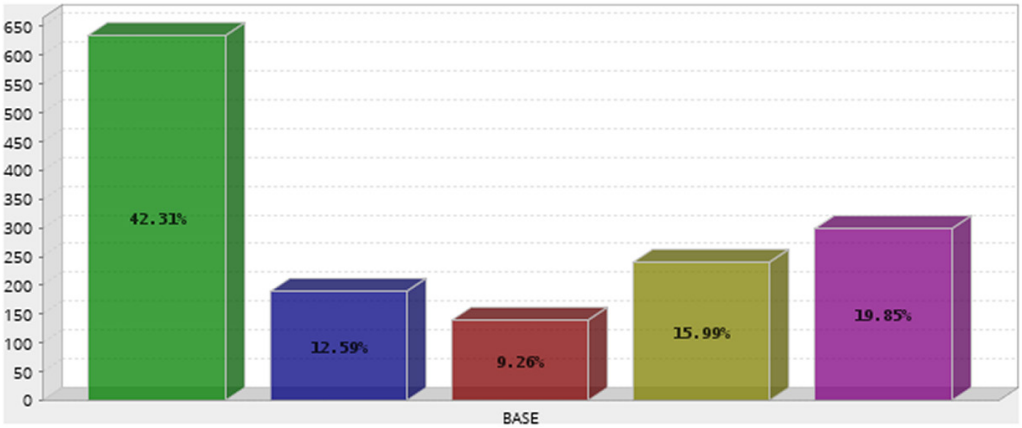


Fig. 4. Overall satisfaction of students with the e-learning experience

3.9 Students' desire to continue e-learning

The results of the student opinion survey regarding their desire to continue with e-learning in the future for at least 25% of their courses indicated that 47% of the students preferred it, whereas 23% did not. This finding could be attributed to students' varying preferences for the educational system used; depending on the courses they were studying, students' responses would logically be distributed based on their desire for e-learning, traditional learning, or a combination of the two.

3.10 Faculty members' experience with e-learning

How do you evaluate your experience in e-learning and teaching (as a faculty member) through the Preparatory Year Deanship's systems? The faculty members' opinion survey results showed complete satisfaction among faculty members regarding their experience with e-learning. The overall satisfaction level reached 4.09, indicating satisfaction on all evaluation items, as per the evaluation scale illustrated in Table 9 below. Moreover, 67% of supporting faculty members expressed satisfaction with the e-learning experience, while 7% felt that their experience needed further development. The rest of the faculty members' opinions were distributed between neutral and acceptable, with a percentage of 24%.

Table 9. Faculty members' experience with e-learning

No.	Item	Average	Evaluation
1	Level of technical support provided during teaching	4.06	Very satisfied
2	Ease of communication with the technical support team to request assistance during teaching sessions	4.13	Very satisfied
3	Adequacy of services provided by the technical support personnel in resolving technical issues during teaching	4.07	Very satisfied
4	Speed of response from technical support when encountering issues during teaching	4.12	Very satisfied
5	Your satisfaction with the level of technical support provided during teaching	4.10	Very satisfied
General Average		4.10	Very satisfied

Note: Rating Scale: (0–0.99) Very Dissatisfied, (1–1.99) Dissatisfied, (2–2.99) Neutral, (3–3.99) Satisfied, and (4–4.99) Very Satisfied.

3.11 Challenges and solutions that arose during the use of e-learning

Due to the novelty of this experience for faculty members, it was characterized by several challenges that were mostly overcome, including:

- Weak Internet connection speeds lead to lower-quality audio or video for virtual classes and sudden disconnections, which can cause complete interruptions of lectures for some students.
- Platform downtime or freezing is due to many users utilizing platform tools simultaneously, resulting in technical issues and error messages.

- There is a lack of a suitable learning environment at home for students, where quietness is observed and no distractions hinder or divert the student's attention from the lecture.
- Some skills require practical application and guidance during skill acquisition, such as practical exercises, which significantly challenge students to master specific skills.

Despite the emergence of numerous challenges during the implementation of e-learning, many solutions have been provided to overcome them. Examples of these solutions include:

- Providing specialized training to faculty members in the department on using e-learning platforms.
- Adhering to the guidelines set by the distance learning department and the assessment and testing quality center when designing assessments.
- Creating digital educational and interactive materials, including videos, to explain the course content and assist students.
- Adopting teaching methods that encourage student engagement and enhance their connection to the lesson topic during remote lectures.
- Allowing for longer durations of practical sessions, enabling each student to showcase their acquired skills and address any misconceptions.
- Incorporating continuous assessments during lectures to encourage student attendance and support ongoing learning.

4 DISCUSSIONS

In the field of knowledge, a study on the effectiveness of using e-learning during the COVID-19 pandemic was found to be neutral among faculty members and students at Imam Abdulrahman Bin Faisal University in the Kingdom of Saudi Arabia. Yet, during the pandemic, there was a significant increase in the use of e-learning, which indicated that not all participants were prepared for it. The results can be attributed to students unexpectedly shifting to entirely online and remote learning methods. This experience was new for most students; hence, they likely needed to develop sufficient and appropriate experiences to evaluate the e-learning environment. This was supported by [48], who indicated that staff and students at the university usually adopt face-to-face learning, and e-learning education is a novelty type that needs to be practiced to improve its level and skills. Furthermore, these results can be explained by faculty members' awareness of the importance of using e-learning in the educational process. E-learning has become a global and essential approach to achieving learning objectives, enhancing the quality and suitability of teaching courses, and aligning with the preferences of students, especially those in the current generation characterized by technological skills.

Perceived lack of experience among online students has been noted as one of the leading online issues by previous studies [49, 50, 51, 24]. Xia et al. [50] found that online learning did not produce positive learning outcomes due to a lack of interaction between students and teachers and a lack of training and technology skills. In their study, Atashinsadaf et al. [49] reported technical challenges among undergraduate nursing students. The result is in concert with the findings obtained by previous studies [52–53]. The results of previous studies [52] indicate that participants had an average level of use of e-learning in educational activities. Another study

conducted by [12] demonstrated that university students in engineering had different perceptions of using e-learning systems [53]. The study also found that students had different perceptions of and levels of satisfaction with using e-learning systems in Malaysian universities during COVID-19.

According to the findings shown in Figure 1, participants indicated that Zoom and Microsoft Teams applications were most widely used during the COVID-19 pandemic, followed by Blackboard and other applications. Those findings are in line with a study carried out in Ukraine [54]. On the other hand, the results of a study conducted in Indonesia [55] differed slightly from this study's findings. Regarding the training and development program organized by the university, the results in Table 5 revealed that the mean was 3.9, which is a high level. The study's findings attribute the faculty's ability to access electronically held training courses to the technology-based teaching strategies used in Saudi universities, which have significantly facilitated faculty members' and students' access to online training sessions. Another reason for the result is the university's efforts to provide regular training courses, whether related to teaching and learning strategies or other academic work matters.

Additionally, the study discovered that the participants who used e-learning during COVID-19 displayed an average level of overall satisfaction, with a value of 3.43, suggesting that faculty members possess technical skills and that the dean's focus is on training them to utilize technology in education. The finding is consistent with the results from previous studies [56–57]. Atashinsadaf et al. [49] reported that despite the technical challenges, the attitudes of students towards e-learning were positive. This finding can be attributed to the significance of these applications at the beginning of the pandemic and their widespread adoption in lectures and other academic activities. The results also reflect the university's use of experiences shared by other Saudi and international universities, leading to the widespread use of these applications in educational processes. Additionally, many students focus on continuous assessments of the course materials to gauge their cognitive and skill levels, and they tend to allocate more time to complete the required assignments for the courses. Therefore, these courses could have directly contributed to enhancing the use of technological tools and methods in educational tasks during the COVID-19 pandemic. The result is consistent with the study by Eltahir et al. [56], who found that participants had positive attitudes toward using e-learning platforms. Moreover, [57] analyzed university students' perceptions of and preferences for using the e-learning system in India, and students indicated that e-learning was flexible and convenient.

Regarding the challenges and difficulties faced by students and faculty members in utilizing e-learning during the COVID-19 pandemic, the results revealed that the primary challenges were network connection interruptions and a lack of the techniques and skills required to use technological equipment. Perceived lack of adequate technical equipment and overall training or support has been noted as one of the leading online issues by previous studies [24]. These findings are in line with previous studies, such as [58–61]. Therefore, the participants recommended that the university provide support to help them improve their skills and experience using technology, such as training programs on using e-learning platforms and incorporating continuous, regular assessments during lectures to encourage student attendance and support ongoing e-learning activities. This study confirmed previous studies' results in terms of challenges in using e-learning in education settings, including [58–59], who demonstrated difficulties in developing skills and preparing innovative online learning strategies and environments. Moreover, in a study by [57], university students evaluated their e-learning experience and mentioned the

challenge of weak internet signals making learning difficult [60]. The authors also indicated that the most common challenges faced by teachers in using e-learning were a lack of knowledge, technological limitations, and limited experience in online teaching. Finally, Saeedi et al. [61] found that several challenges were noticed among teachers, such as technical, teaching-learning, and sociocultural challenges.

5 CONCLUSIONS AND RECOMMENDATIONS

This study assessed the effectiveness of e-learning during the COVID-19 pandemic from the perspective of students and faculty members at Imam Abdulrahman Bin Faisal University in the Kingdom of Saudi Arabia. The aim was to determine the real-life experiences of these participants. Both students and faculty members in this study had high levels of efficiency and satisfaction with various aspects of the e-learning experience. The positive common points they highlighted apply to teaching methods and assessment systems and provide a strong foundation for building an effective future system that combines traditional techniques with e-learning. This study also aimed to determine students' and faculty members' level of satisfaction with e-learning at the university. The results indicate that participants' satisfaction with the e-learning environment ranged from moderate to high, with an average rating of 3.43. Regarding the main obstacles to utilizing e-learning during the COVID-19 pandemic, the results highlight that a lack of experience in managing virtual classrooms and electronic assessments was the primary challenge for faculty members. However, this challenge was swiftly addressed through the establishment of training committees and intensive technical support from within the deanship. This involved leveraging the expertise of the computer department's members and guiding faculty to participate in training courses and workshops organized by the deanship and the university. Meanwhile, technical glitches and internet connectivity disruptions posed the most significant challenges for students during virtual classes and online assessments.

With this view of e-learning education, institutions should regularly assess the role of teachers, students, and decision-makers in the educational learning process. The study was conducted at a single university in the Kingdom of Saudi Arabia, and the results cannot be generalized to all universities. Similar studies should be carried out with similar objectives to assess the impact of e-learning on the educational process. Additionally, a comparison of e-learning usage across national and international universities is suggested. Although first-year students account for a high number of university students, the results cannot be generalized to all university students. Thus, the study should be conducted on samples representing students from various faculties and educational levels within the university. The development of the education and learning system in colleges should involve integrating e-learning with traditional methods to varying degrees based on the nature of the courses. Investment in the electronic infrastructure of colleges should be expanded accordingly to align with the future needs of e-learning systems, ensuring not only data privacy and security but also essential continuous training for both students and faculty members within the deanship to remain updated on the latest systems and technologies in the fields of education, learning, and e-assessments. Finally, a digital student activities system should be established that supports collaborative work while adhering to the required physical distancing measures, especially considering the COVID-19 pandemic.

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