Research Article

Perception of Students about E-learning: A Single-center Experience from Saudi Arabia

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ABSTRACT

Introduction: E-learning is the use of the internet and associated devices for educational purposes without geographical constraints. This study aims to assess the perception of students at King Saud bin Abdulaziz University for Health Sciences in Jeddah, Saudi Arabia, about E-learning as a teaching modality.

Methods: This cross-sectional study was conducted between June 2017 and June 2018. The inclusion criteria consisted of healthcare students (medicine, nursing, and college of sciences and health professions). A 40-item closed-ended questionnaire was distributed to the participants and was divided into six main parts: perception, diversity, implications, efficiency, acceptability, and accessibility of E-learning.

Results: The response rate was 94.4% (total = 410, retrieved = 387), of which 61.8% (n = 239) stated that they had heard something about E-learning. Meanwhile, 52.2% (n = 202) of students had no idea about virtual patients. Notably, 73.1% (n = 283) agreed that cell phones can be used as a teaching modality, whereas 52.2% (n = 202) opined that cell phones can play a role in stimulating critical thinking among medical students. Sixty percent (n = 232) of students believed that E-learning has the potential to expand educational opportunities. Compared to male students, female students had a higher perception of cheating and fraud (p = 0.039) during E-learning as well as perception of a decline in personal efforts in quest of knowledge (p = 0.032).

Conclusion: There is a growing positive perception of E-learning, but the level of acceptance remains low. Further research is required on how to enhance and maximize the confident utilization of ever-increasing opportunities in E-learning. Establishing well-developed E-learning facilities in Saudi educational institutions will tremendously enhance educational opportunities for its students.

1. INTRODUCTION

E-learning is the use of the internet and associated devices for educational purposes without geographical constraints [1]. E-learning is still at an incipient stage in many parts of the world including Saudi Arabia, although it is a well-recognized modality of teaching at many reputable international institutes [2]. The learning–teaching process in medical education has evolved over the years, with doctors facing many challenges introduced in this new world of technology [3]. To implement a successful technological program, we have to know about many of the social and behavioral factors that can impact a smoothly running E-learning program. Knowing these factors can facilitate a harmonious success of such programs efficiently [4].

The number of healthcare colleges and healthcare graduates in Saudi Arabia has increased significantly over the past few years. New private colleges have started investing in medical education in particular. In addition, other government hospitals that provide advanced healthcare services have started establishing new medical colleges. These colleges adopt three recognized educational models: traditional learning, problem-based learning, and hybrid learning. The government of Saudi Arabia has supported the implementation of E-learning into the higher education system since April 2006. It was noticed that the Saudi higher education system was gradually shifting from a traditional face-to-face classroom setting into a more computer-based system [5].

In 2006, the Ministry of Health established the National Centre for E-learning and Distance Learning, and in 2007, the Saudi Government established the National Communication and Information Technology Plan to ensure the best possible use of information and communication technology and the use of E-learning at all levels of education. Currently, several Saudi

universities have established E-learning departments with King Fahd University of Petroleum and Minerals being the first to establish a department in 2003 [6]. Although several universities have established E-learning departments, the effect of these departments is minute and invisible. Therefore, initiatives to introduce E-learning in Saudi Arabia have led to a rapid increase in E-learning despite challenges that might affect the adoption and successful application of this modality of education.

At King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), we still lack a well-developed E-learning department where evidence-based E-learning tools could be inculcated to improve the efficiency and effectiveness of our curriculum. Prior to starting such an endeavor, it is better to know about the perception of the faculty and students about E-learning. This will guide us to know where and how to start and to predict the degree of resistance or acceptance that we will encounter if we are planning to establish such a department in KSAU-HS. The aim of this study is to assess the perception of students at KSAU-HS in Jeddah, Saudi Arabia, about E-learning as a teaching modality.

2. MATERIALS AND METHODS

This is a cross-sectional study was conducted at KSAU-HS in Jeddah, Saudi Arabia. Data collection started in June 2017 and was completed in June 2018. The inclusion criteria consisted of healthcare students (medicine, nursing, and sciences and health professions) who were willing to participate and fill out the questionnaire. A total of 410 questionnaires were distributed, and a total of 387 were retrieved (94.4% response rate). There are three functional colleges at KSAU-HS in Jeddah, Saudi Arabia, so the stratified random sampling technique was used. This sampling technique ensures that every person in the study population has an equal or known probability of being included in the sample.

The instrument used in this study was a 40-item closed-ended questionnaire distributed to the participants by trained data collectors (students). The questionnaire was divided into six main parts: perception regarding E-learning, diversity of E-learning, implications of E-learning, efficiency of E-learning, acceptability of E-learning, and accessibility of E-learning.

Statistical Package for the Social Sciences (SPSS), Version 23 (IBM Corporation, Armonk, NY, USA) was used to analyze the collected data. To summarize quantitative variables, descriptive statistics such as mean, median, and standard deviation were used. Frequencies and percentages were used to summarize qualitative variables. The inferential statistical chi-square test was used for the comparison of two or more variables. The level of significance (p-value) was determined at $p < 0.05$.

To ensure the confidentiality of information, all questionnaires were completed and submitted anonymously. Furthermore, the cover page of each questionnaire explained confidentiality issues, including instructions on how to complete the questionnaire and provided space for participants to give informed consent to participate in the study. The Institutional Review Board of King Abdullah International Medical Research Center approved this study.

3. RESULTS

3.1. Demographic Profile

A total of 387 students participated in the study. The detailed demographic data are summarized in Table 1.

3.2. Perception of the Basic Concepts of E-learning

Majority of the students (61.8%) stated that they heard something about E-learning, but they (66.7%) did not hear about webinars. In addition, the majority of the students (71.0%) reported that they did not attend any E-learning courses, and they do not know if their friends attended such courses (Table 2).

Table 1 | Demographic profile of participants

Item	Frequency	Percentage (%)
Sex		
Male	230	59.4
Female	157	40.6
College		
College of Medicine	109	28.2
College of Nursing	66	17.0
College of Sciences and Health Professions	200	51.7
Unclassified	12	3.1
Academic year		
1st year	132	34.1
2nd year	109	28.2
3rd year	86	22.2
4th year	25	6.4
5th year	15	3.8
6th year	7	1.9
Unclassified	13	3.4

Table 2 | Perception regarding the basic concept of E-learning

No.	Questions	Yes (%)	No (%)	I don't know (%)
1	Did you hear something about E-learning?	239 (61.8)	117 (30.2)	31 (8.0)
2	Have you attended any E-learning courses?	94 (24.3)	275 (71.0)	18 (4.7)
3	Has any of your friends/colleagues attended E-learning courses?	119 (30.8)	107 (27.6)	161 (41.6)
4	Have you heard about webinars?	51 (13.2)	258 (66.7)	78 (20.1)
5	Do you have an idea of a virtual patient?	96 (24.8)	202 (52.2)	89 (23.0)
6	Can it help you absorb knowledge at your pace?	123 (31.8)	53 (13.7)	211 (54.5)
7	Can it be used as a flexible mode of teaching?	170 (43.9)	44 (11.4)	173 (44.7)
8	Have you ever heard of asynchronous E-learning?	38 (9.8)	241 (62.3)	108 (27.9)

3.3. Perception of the Diversity of E-learning

The majority of the students (73.1%) believe that cellular phones can be used as a teaching modality. In addition, they (52.2%) believe that it can play a role in stimulating the critical thinking of medical students (Table 3).

3.4. Perception of the Implications of E-learning

Sixty percent of the students believe that E-learning has the potential to expand educational opportunities, and about 45% believe that it can have a role in competency-based training. In addition, 195 (50.4%) believe that simulated technology can be delivered by E-learning. However, 143 (36.9%) believe that it cannot replace traditional tutor-led training, and more than 40% think that it would increase the risk of cheating and fraud and reduce social contact (Table 4).

3.5. Perception of the Efficiency of E-learning

About 45% (181) of the students believe that E-learning is a resource-hungry process, but 215 (55.8%) do not know if it would be a nuisance. In addition, more than 55% of the students believe that E-learning would be convenient and save time (Table 5).

3.6. Perception of the Acceptability of E-learning

The majority of respondents (48.1%) believe that there would be resistance from teachers to adopt E-learning as a teaching modality,

Table 3 | Perception regarding the diversity of E-learning

No.	Questions	Yes (%)	No (%)	I don't know (%)
1	Can a cell phone be used as a teaching modality?	283 (73.1)	64 (16.5)	40 (10.4)
2	Would it bring colors to the process of learning?	269 (69.5)	50 (12.9)	68 (17.6)
3	Would it enhance the problem solving ability of the students?	217 (56.1)	46 (11.9)	124 (32.0)
4	Can it play a role to stimulate the critical thinking among medical students?	202 (52.2)	57 (14.7)	128 (33.1)
5	Can it have a positive impact on the learning of post graduate medical students?	228 (58.9)	43 (11.1)	116 (30.0)
6	Can it be used as a blended teaching modality?	268 (69.2)	42 (10.9)	77 (19.9)
7	Would you prefer to have a video conferencing with a simulated patient over real time interaction?	186 (48.1)	123 (31.8)	78 (20.1)

Table 4 | Perception regarding the implications of E-learning

No.	Questions	Yes (%)	No (%)	I don't know (%)
1	Does it have the potential to expand educational opportunities?	232 (60.0)	31 (8.0)	124 (32.0)
2	Do you think E-learning can have a role in competency based training?	177 (45.8)	57 (14.7)	153 (39.5)
3	Can simulated technology be delivered by E-learning?	195 (50.4)	51 (13.2)	140 (36.2)
4	Can it replace traditional tutor led training?	126 (32.6)	143 (36.9)	118 (30.5)
5	Can E-learning lead to less clinical settings errors than real time learning?	112 (28.9)	111 (28.7)	164 (42.4)
6	Do you think the risks of cheating and fraud would be higher?	167 (43.2)	89 (23.0)	131 (33.8)
7	Do you think students would not be compliant?	100 (25.8)	98 (25.3)	189 (48.9)
8	Does it have the potential to decrease social contact?	159 (41.1)	88 (22.7)	140 (36.2)

Table 5 | Perception regarding the efficiency of E-learning

No.	Questions	Yes (%)	No (%)	I don't know (%)
1	Is E-learning a resource hungry process?	181 (46.8)	103 (26.6)	103 (26.6)
2	Do you think e-learning would be a nuisance?	68 (17.6)	103 (26.6)	215 (55.8)
3	Do you think use of E-learning would be convenient?	215 (55.6)	56 (14.5)	116 (29.9)
4	Do you think E-learning would save your time?	231 (59.7)	64 (16.5)	92 (23.8)
5	Do you think E-learning can minimize your efforts in the quest of search for medical knowledge?	203 (52.5)	68 (17.6)	116 (29.9)
6	Do you think teachers would need additional training for the smooth running of an E-learning program?	250 (64.6)	44 (11.4)	93 (24.0)
7	Do you think students would need additional training to get accustomed to an E-learning program?	218 (56.3)	65 (16.8)	104 (26.9)
8	Do you think E-learning would be an additional financial burden on our economy?	145 (37.5)	96 (24.8)	146 (37.7)

but the students would be less resistant and would be comfortable using it (Table 6).

3.7. Perception of the Accessibility of E-learning

The majority of the students (more than 50%) believe that both faculty and students have easy access to the internet. In addition, they (49.9%) believe that they will have easy access to the tools required for E-learning (Table 7).

The independent *t*-test was used to compare and determine any statistical significance between male and female students. It was found that colleagues of male students attended more E-learning courses. In addition, colleagues of female students thought that E-learning would increase the risk of cheating and fraud ($p = 0.039$) but would minimize the efforts in the quest of knowledge ($p = 0.032$).

Analysis of variance was used to compare the three colleges. Regarding having some awareness about E-learning, a statistically

Table 6 | Perception regarding the acceptability of E-learning

No.	Questions	Yes (%)	No (%)	I don't know (%)
1	Do you think there would be resistance from teachers to adopt E-learning as a teaching modality?	186 (48.1)	63 (16.3)	138 (35.6)
2	Do you think there would be resistance from students to adopt E-learning as a teaching strategy in medical education?	130 (33.6)	140 (36.3)	117 (30.2)
3	Do you think the society on the whole would accept E-learning as a teaching strategy in medical schools?	144 (37.2)	109 (28.2)	134 (34.6)
4	Do you think the patients would feel safe to be treated by doctors trained by a blended teaching strategy?	120 (31.0)	120 (31.0)	147 (38.0)
5	Would you be comfortable to use it?	187 (48.3)	73 (18.9)	127 (32.8)

Table 7 | Perception regarding accessibility of E-learning

No.	Questions	Yes (%)	No (%)	I don't know (%)
1	Do you think faculty has easy access to internet?	229 (59.2)	99 (25.6)	59 (15.2)
2	Do you think students have easy access to internet?	196 (50.7)	141 (36.4)	50 (12.9)
3	Do you think you will have easy access to tools needed for E-learning?	193 (49.9)	71 (18.3)	123 (31.8)

significant difference was found between the three colleges where students of the college of sciences and health professions responded that they had not only heard, but they and their friends have also attended more E-learning courses as compared to other colleges, and they believe that not only is it a flexible mode of teaching but will also help students absorb knowledge at their own pace; meanwhile, college of nursing students considered it a diverse way of teaching as it can be used as a blended teaching modality. Regarding having some awareness about E-learning, a statistically significant difference was found between the three colleges, in which nursing students believe that there would be resistance from the teachers to adopt it as a teaching modality. Significant differences between the colleges were observed in many items regarding implications and efficiency. As far as accessibility is concerned, students at the college of sciences and health professions believe they have easy access to the tools and requirements for E-learning.

4. DISCUSSION

In 1997, the internet became available in Saudi Arabia but was limited to governmental institutions only, and it was not until 1999 that it became publicly available [7]. The number of internet users in Saudi Arabia has increased from 1.4 million in 2002 to more than 20 million users in 2016 [8]. Most participants believe that faculty and students have easy access to the internet (59.2% and 50.7%, respectively). In addition, about 50% of the participants think that they will have easy access to tools needed for E-learning. The results of our study indicate that a significant number of the participants have never heard about E-learning or attended any E-learning courses. In addition, a significant number has indicated that none of their friends or colleagues has attended any E-learning courses. This indicates that despite the widespread presence of universities in Saudi Arabia and the establishment of centers for E-learning and distant learning, Saudi Arabia is still in the early stage and faces many challenges, particularly in terms of perception regarding the basic concepts of E-learning.

Two types of E-learning exist: synchronous and asynchronous. Synchronous E-learning involves an instructor with direct and immediate interaction through a communication system. Asynchronous E-learning involves educational activities without direct and immediate interaction. A webinar is a seminar (presentation, lecture, or workshop) that is conducted over the internet [9]. The results of our study demonstrated that most of our students were not familiar with these two concepts—asynchronous E-learning and webinars. These obstacles might hinder the adoption and successful application of E-learning in Saudi Arabia, for which human participants are most important.

A virtual patient is a term used to describe computer-based interactive simulations used in healthcare education, in which one special focus is the clinical processes. The virtual patient may take a number of different forms including interactive patient scenarios, case presentations, and high-fidelity simulations using either software or manikin [10]. In our study, almost half of the respondents had no idea or have never heard about the concept of a virtual patient. This may be explained by the fact the most of the participants in our study were in their 1st and 2nd years of study.

Establishing an E-learning department is expected to enhance the process of self-directed learning, where the students themselves

would have more control over the process of learning, although few might not be comfortable, as some have reported it to be impersonal [11]. The results of our study confirm the need for E-learning at KSAU-HS, and this paper is considered an urgent call to establish a well-developed E-learning department at KSAU-HS where evidence-based E-learning tools could be inculcated to improve the efficiency and effectiveness of our curriculum.

E-learning can be tailored according to the needs of students and suitability of time as it is a flexible way of effective learning. With this modality, the learners can have access to a vast amount of tools of learning materials without any geographical constraints [12]. These observations were confirmed by the results of our study, as more than one-third of the respondents think that E-learning can help students absorb knowledge and is a flexible mode of teaching. Again, a significant number of respondents have little knowledge about the details of the benefits of E-learning. Respondents think it can play a major role in stimulating critical thinking and enhance the problem-solving abilities of medical students with a positive impact on the learning of postgraduate medical students.

Seeking information is a critical skill within the healthcare field, especially with new modes of information delivery such as smartphone technology, which enables physicians and students to access reliable, up-to-date information at the bedside [13,14]. In our study, the majority of participants think that cellular phones can be used as a teaching modality, which makes learning more colorful and fruitful.

Blended learning is defined as a combination of E-learning with face-to-face workshops/practical sessions. Over the past few years, the drive to incorporate blended learning into medical education worldwide has increased tremendously [15]. Our study confirmed this fact as the majority of respondents think that E-learning can be used as a blended teaching modality. Almost half of the participants would prefer video conferences using a simulated patient over real-time interaction.

A significant number of participants in our study believe that the implication of E-learning will expand educational opportunities. This confirms the fact that E-learning is available to people 24 h a day, 7 days a week, around the globe. In addition, E-learning will enable organizations including medical schools to easily distribute learning materials to multiple locations and participants. Students can access the learning material when it is convenient for them at home or in the office [11].

According to Gervais [16], competency-based education is an outcome-based approach to education that incorporates modes of instructional delivery and assessment efforts designed to evaluate mastery of learning by students through their demonstration of the knowledge, attitudes, values, skills, and behaviors required for the degree sought. Unfortunately, almost 40% of the respondents in our study did not know the concept of competency-based learning. About 45% of the sample studied believe that the implication of E-learning can have a role in competency-based learning.

About 50% (195) of our students believe that simulated technology can be delivered by E-learning. The simulation model is developed through electronic specialized computer software and helps to approximate the real or abstract world to the students' minds for the purpose of learning and training [17]. This is an urgent call to incorporate simulation in E-learning in high-income countries such as Saudi Arabia.

In our study, more than one-third of the respondents believe that E-learning cannot replace traditional tutor-led training, whereas 32.6% believe that it can. Approximately 30% of respondents do not know the answer. Traditional tutor-led classroom training will not be replaced by E-learning. This is because of the nature, relative value, and importance of some educational content that is not suitable for online delivery. About 40% of the respondents in our study believe that E-learning has the potential to decrease social contacts.

The perception of our students regarding the implications of E-learning is positive because 98 (25.3%) participants believe that students will be compliant with E-learning. Approximately 55% of the participants think that E-learning is convenient, and 28.8% believe that E-learning will lead to less clinical setting error. Roughly 60% of respondents believe that E-learning would save their time, and 52.5% think that E-learning can minimize their effort in the quest for medical knowledge. This is consistent with most of the framework for effective continuing education. The results of our study are similar to studies conducted in Saudi Arabia, the United States, and Europe [18].

In our study, replies to most of the questions indicate that a large percentage of respondents do not know the answer. Some of these percentages may reach 50%. Campaigns for teaching and advocating for E-learning is mandatory. In addition, 64.6% of respondents believe that teachers would need additional training for the smooth running of an E-learning program, and 56.3% of students require additional training to get accustomed to an E-learning program.

A significant number (167) of participants in our study (43.2%) think that the risk of cheating and fraud would be higher if E-learning is adopted. Studies have found that self-reported cheating is more prevalent in online classes than in traditional lecture courses. It is estimated that among those who had taken an E-learning course, 24–33% admitted to having cheated on a web-based examination [19].

In our study, 181 (46.8%) respondents believe that E-learning is a resource-hungry process, and only 68 (17.6%) think that E-learning would be a nuisance. Many of the students in Saudi Arabia complain of high tuition fees, which places a huge burden on their families [20]. The results of our study indicate that 37.5% of our students believe it would be an additional financial burden on our economy, especially with the current financial constraints. More than 60% either do not believe (24.8%) or do not know (37.7%) whether E-learning would be an additional financial burden on our economy.

On students' perception regarding acceptability, only one-third of respondents believe that there would be no resistance from students to adopt E-learning as a teaching strategy in medical education. Majority of students either do not know or felt that they had no motivation to learn with the E-learning system and complete their studies. Our study results are similar to those reported in 2008 by Elango et al. [21], who showed that 35.7% of students who were interviewed were not happy with the course content and the quality of the method used in delivering education. Policies should be changed to enable students to earn virtual online degrees, regardless of where the university might be.

The resistance from teachers to adopt E-learning as a teaching modality was high in our study at 48.1%. In addition, 28.2% of

the respondents think that society as a whole would not accept E-learning as a teaching strategy in medical schools. Cultural resistance among staff has been previously identified as a barrier to student engagement with E-learning [22]. This could be related to putting extra pressure on the already overworked faculty. To implement E-learning within a medical school, providing robust evidence-based research may strengthen one's position to encourage faculty members to take part in this program. It will also aid in addressing concerns among medical faculty who may be resistant to E-learning integration into teaching practices. Therefore, staff-focused initiatives may be key to the introduction of a successful E-learning program [12].

In our study, about half of the respondents felt comfortable using E-learning. This is most probably related to the availability of high-speed computers, high-capacity corporate networks, and the World Wide Web. Online training is less intimidating than classical courses, and learners can make mistakes without exposing themselves. This is particularly important when they try to learn soft skills such as communication skills, leadership skills, and decision making. This type of learning experience eliminates the embarrassment of mistakes and failure in front of a group [23].

Medical errors are a significant cause of morbidity and mortality with approximately 100,000 annual deaths in the United States. This applies to healthcare systems in both developing and developed countries [24]. In a study performed by Gaupp et al. [25], E-learning can be used to teach patients safety, and a specifically designed E-learning program can foster the development of specialized programs that facilitate the understanding of complex sociotechnical systems within healthcare organizations. About one-third of respondents think that patients would feel safe being treated by doctors trained under a blended teaching strategy. Two-thirds of the respondents do not agree with this statement or do not know the answer.

The main limitation of this study is the fact that it is a single-center experience. Participation of multicenter institutions and several universities in the whole kingdom will provide a very strong basis when it comes to implication and recommendation. We also suggest doing research on the implications and efficiency of E-learning in postgraduate residency training programs. The other limitation is the cross-sectional design of the study.

5. CONCLUSION

E-learning is not yet well developed in Saudi universities, although constant efforts are being made to expand E-learning facilities. The increasing positive perception of students about E-learning is a good omen. There is a need to increase the level of acceptance of E-learning, both among students and teachers. This can be achieved by establishing well-developed E-learning facilities in Saudi educational institutions. The move will bring Saudi Arabia's educational system in parallel with the educational systems of developed countries around the world.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

AUTHORS' CONTRIBUTION

HA and BS contributed in study conceptualization and writing (review and editing) the manuscript. SNA contributed in data curation. AA and AS contributed in project administration. HA supervised the project. AA, AS and MAK contributed in formal analysis and writing (original draft) the manuscript.

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