Original Article

Strengths and Weaknesses of Asynchronous E-learning in Nursing Education Throughout the COVID-19 Crisis: A Qualitative Study

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Abstract

Background: Despite the introduction of e-learning in recent years, it has not been utilized as a major educational method in numerous universities, especially in the area of medical and health sciences, until the crisis of the COVID-19 pandemic.
Objectives: This study aimed at explaining the strengths and weaknesses of asynchronous e-learning in nursing education throughout the COVID-19 crisis.
Methods: In this qualitative descriptive study, a total of 14 nursing faculty members were selected using the purposive sampling method. The interviews were conducted face-to-face with semi-structured questions. The researcher recorded all interviews with the participants' consent. Data analysis was conducted in four phases using the content analysis approach (Graneheim and Lundman).
Results: Nursing faculty members cited "low quality of educational content", "cold and soulless education", "low efficiency in clinical education", and "insufficiency in educational assessment process" as the weaknesses and "maintenance of safe education during the COVID-19 crisis" as the strength of asynchronous e-learning in nursing education during the COVID-19 crisis.
Conclusion: Asynchronous e-learning was shown to have various weaknesses in nursing theoretical and clinical education. However, the most striking strengths of this method in the COVID-19 pandemic were found to be the protection of the safety and health of individuals, followed by the maintenance of academic activities and education. Therefore, it is worthwhile for all nurse researchers, academic education policy-makers, and faculties to put conscious effort into developing standard protocols for the preparation of educational content, empowering lecturers in the area of online education, and using other methods to promote dynamic interactions.

Keywords: Asynchronous, COVID-19, E-learning, Nursing

1. Background

On 31 December 2019, an outbreak of atypical pneumonia caused by a novel coronavirus was reported in Wuhan, China (1, 2). As of 25 March 2020, about 150 countries temporarily closed colleges and educational institutions, which involved more than 80% of the world's students (3). The threat posed by the novel coronavirus altered the delivery method of educational programs worldwide (4). Since it was no longer possible to carry out face-to-face traditional teaching activities (5), universities were forced to migrate to remote teaching through online courses (6).

E-learning refers to those formation activities and data transfer performed online so that it is utilized for conducting courses, assignments, and assessments (7). There are three approaches to e-learning, including asynchronous, synchronous, and bichronous learning (8). In synchronous e-learning, both the teacher and student have to be simultaneously online as they must meet in an operating system and work together just like in a classroom. In asynchronous e-learning, unlike synchronous e-learning, there is no need for teachers and students to be present at the same time (9). The combined use of synchronous and asynchronous e-learning methods is referred to as bichronous e-learning (8, 9).

Due to the flexible modus operandi of asynchronous e-learning, it has been one of the most common forms of online learning (10). Asynchronous environments provide students with material in the forms of audio/video lectures, pamphlets, articles, and PowerPoint presentations. These materials can be accessed anytime and anywhere through the Learning Management System (LMS) or other educational systems (9). Asynchronous e-learning, as a learner-oriented approach, originates from constructivist theory and emphasizes the importance of peer-to-peer interactions (11). An asynchronous environment leads to autonomous, independent, and student-centered learning (12). This approach merges self-learning and asynchronous interactions to enhance learning and can be used to facilitate on-campus or regular university education, distance education, and continuing education (11).

The provision and application of online learning materials in the e-learning system have been one of the major challenges for numerous universities during the coronavirus disease 2019 (COVID-19) pandemic (13). What was achieved after the forced closure of institutions was not the best face of online education. Nevertheless, educational institutions applied a method called Emergency Remote Teaching (ERT), Which has been used as a quick and temporary solution to the impossibility of continuing face-to-face education (14).

Prior to the COVID-19 pandemic, almost all universities of medical sciences in Iran were using face-to-face learning. However, they currently offer the total content of their theory courses using asynchronous e-learning in the LMS platform. Regarding the fundamental changes that occurred during the COVID-19 crisis due to the abrupt transition to asynchronous e-learning, the need for a comprehensive and in-depth study based on the experiences of lecturers who utilized e-learning for education is felt more than ever. Accordingly, the explicit and implicit dimensions of this educational approach could be identified. The ERT may seem like a unique and transient experience to us. Nonetheless, considering the experiences of other countries, such as Afghanistan or South Africa, this is not the first time that such changes have to be implemented temporarily (15). Likewise, educational institutions will probably need to discontinue their face-to-face education in the future due to new social conditions, emergencies, and other reasons (15, 16). Therefore, an incident management plan should be included in the strategic plans of academic organizations (16).

2. Objectives

This study was conducted using a qualitative naturalistic approach and aimed at explaining the strengths and weaknesses of asynchronous e-learning in nursing education during the COVID-19 crisis.

3. Methods

3.1. Study Design

This qualitative descriptive study was carried out to investigate the strengths and weaknesses of asynchronous e-learning in nursing education during the COVID-19 crisis based on the experiences of nursing faculty members. The reason for selecting this approach was that it provides first-hand facts associated with a phenomenon, such as the insight of nursing faculty members regarding a less understood event or phenomenon (17). Sandelowski emphasizes that if a researcher desires to provide a straight description of a phenomenon or event, the qualitative description will be the method of choice (18).

3.2. Participants and Setting

In this study, a total of 14 nursing faculty members were recruited from the XXX School of Nursing and Midwifery located in northwestern Iran, using the purposive sampling method in January 2021 (Table 1). The XXX School of Nursing and Midwifery was established as the first nursing school in Iran approximately 105 years ago. This school provides baccalaureate and master's degree programs in both nursing and midwifery, an associate degree program in Emergency Medical Services, and a doctoral program in nursing. Concerning the outbreak of COVID-19, all theoretical courses and some practical courses have been presented using asynchronous e-learning in the LMS. Inclusion criteria consisted of (a) being a full-time faculty member, (b) having the experience of teaching online theory courses, and (c) being willing to participate in the study and share one's experiences. On the other hand, the lack of teaching theory courses virtually was considered an exclusion criterion.

3.3. Data Collection

The data was gathered by the first author (YM) and the corresponding author (RH) using semi-structured face-to-face interviews. All interviews were conducted with strict adherence to the standards of personal protection in the offices of the participants at XXX School of Nursing and Midwifery. Participants were requested to share their experiences regarding the main question of the study, which was as follows:

"In your opinion as a lecturer, what are the strengths and weaknesses of asynchronous e-learning in nursing education during the COVID-19 crisis? Please tell us about your experiences in this area."

The interviewer continued the interviews based on the participants' answers to a more in-depth analysis of their perspectives on the main question of

Table 1. Demographic characteristics of the study participants

Participant no.	Age (years)	Gender	Educational level	Academic degree
P1	59	Male	PhD	Associate Professor
P2	42	Male	MSc	Lecturer
P3	32	Male	PhD	Assistant Professor
P4	61	Male	MSc	Lecturer
P5	46	Female	PhD	Assistant Professor
P6	39	Female	MSc	Lecturer
P7	38	Female	MSc	Lecturer
P8	40	Female	MSc	Lecturer
P9	52	Male	PhD	Assistant Professor
P10	39	Male	PhD	Assistant Professor
P11	31	Female	MSc	Lecturer
P12	28	Male	MSc	Lecturer
P13	33	Female	MSc	Lecturer
P14	46	Male	PhD	Assistant Professor

the study using probing questions, such as *"What do you mean by that?", "Can you explain more please?", "Can you please clear up what you mean?", "Why?", and "How?"*.

The researcher recorded all interviews with the participants' consent. Each interview lasted for approximately 45 min. Interviews continued until reaching data saturation, in which no new concepts arose from the analysis.

3.4. Data Analysis

Data analysis was conducted in four phases using the content analysis approach (Graneheim and Lundman) [19]. In the first phase, two authors (YM and RH) listened carefully to the recorded remarks of the participants at the end of each interview. In the second phase, the participants' remarks were transcribed word by word and entered into a Microsoft Word document. In the third phase, data were analyzed and categorized using MAXQDA software (version 10; VERBI, Berlin, Germany) and the concepts were extracted. In the last phase, the semantic units were discerned and encoded after a precise examination of the transcripts. In this phase, the initial codes were constructed as in vivo and implicit codes. The codes were then integrated and categorized into sub-themes and themes based on the similarities between the concepts. The researchers also made their efforts to achieve the highest homogeneity within the categories and the highest heterogeneity between them.

3.5. Rigor and Trustworthiness

Guba and Lincoln have suggested four criteria of credibility, transferability, confirmability, and dependability for assessing and certifying the accuracy and rigor of qualitative data [20]. To increase the credibility of the findings, the researchers attempted to build up a good and friendly interaction with the participants that was conducive to the maximum freedom of opinion and expression. To ensure that the findings mirrored the perspectives of the participants, a list of the extracted codes and categories was given to five of the participants to get their feedback (member-checking). In addition, the findings were examined by three people outside the study (external auditing) to improve the credibility of the data. To establish the transferability of the findings, the researchers attempted to provide a comprehensive analysis of the study context, participants' demographics, sampling method, and the time and place of data collection. To ensure confirmability of the findings and ease of follow-up by others, the researcher precisely recorded and stated the study and decision-making processes. To evaluate the dependability of the findings, external audits assessed the accuracy of the interpretations and conclusions. External auditing enabled the researchers to figure out the similarities

and differences between their perception of extracted concepts and those of the external audits.

3.6. Ethical Considerations

Before initiating the study, ethical approval was received from the Regional Committee for Medical and Health Research Ethics (Approval ID: IR.UMSU.REC.1399.194). The researcher then presented himself and explained the study objectives to the participants. Written informed consent was also obtained from all participants, and they were assured of the confidentiality of their personal information in this study. They were also ensured that all recorded interviews would be removed after the full transcription of their contents.

4. Results

After data analysis, a total of 33 codes, 5 themes, and 11 sub-themes were extracted. The study participants cited four themes of "low quality of educational content", "cold and soulless education", "low efficiency in clinical education", and "insufficiency in educational assessment process" as the weaknesses and one theme of "maintenance of safe education during the COVID-19 crisis" as the strength of asynchronous e-learning in nursing education (Table 2).

4.1. Weaknesses of Asynchronous E-Learning
Theme 1: Low quality of educational content

The contents prepared by the professors were structured but did not follow the same methods. Therefore, the word "heterogeneous" is an abstract concept resulting from the experiences of the participants in the study, which is correctly used here.

Sub-theme: Heterogeneous educational content

The lack of an established protocol for creating educational content among lecturers and dissimilarity in the quality of educational content in making intrapersonal and interpersonal comparisons among lecturers made it difficult for students to access good quality educational content. One of the participants described his experiences in this regard as follows:

"...The quality of educational content was not the same. Each lecturer had a different view on how to teach and didn't act through a standard method. Some of our colleagues think that cyberspace only means that they have to upload the content in PDF format or audio files in the considered online education portal! There was no particular protocol for us in online education" (P1).

Sub-theme: Fear of legal burden

Knowledge of the fact that online content could be used as documentary evidence (i.e. the risk of error disclosure and the fear of legal burden) resulted in

Table 2. Themes, sub-themes, and codes extracted from data analysis

Theme	Sub-theme	Code
Low quality of educational content	Heterogeneous educational content	Lack of an established protocol for creating educational content
		Dissimilarity in the quality of educational content
	Fear of legal burden	Self-censorship in expressing some subjects
		Risk of error disclosure
Cold and soulless education	Lack of emotional climate and social interactions	A decline in motivating students to learn
		Lack of emotional interactions
		Students' lack of modeling classroom behaviors
	Lack of live and dynamic interactions	Lack of mutual recognition between the lecturers and students
		Reduction of group interactions
		One-way communication
		Low liveliness compared to face-to-face learning
Weaknesses	A tendency towards abstraction and theorization	Difficult understanding of the process of performing practical skills
		Low flexibility in practical courses
		Non-repeatability in performing procedures
Low efficiency in clinical education	Deficiency in gaining clinical experience	Lack of clinical interactions
		Lack of knowledge of actual nursing situations
		Lack of experience of stress caused by visiting the patient in clinical settings
		Impossibility of learning practical skills
Insufficiency in the educational assessment process	Poor-quality assessment	Lack of efficient evaluating system for student assessment
		Incomplete student assessment
		Perfunctory exam-taking
	Failure to provide appropriate conditions for taking examinations	Probability of losing internet connection during the exam
		Possibility of cheating on exams
Strengths	Safety protection	Reduction in disease transmission
		Consistency with social distancing
		Protection of the health of lecturers and students
Maintenance of safe education in the COVID-19 crisis	Flexibility	Lack of space-time constraint
		Repeatability of educational content
		Greater accessibility
	Affordability	Shortening the study period
		Reduction in commuting expenses
		Saving energy
		Saving time

lecturers being cautious when presenting content and using examples; therefore, they refused to give some additional explanations and examples and self-censored during online education. One of the participants described his experiences in this regard as follows:

"…Sometimes I had to censor my own words and explanations. The students might misunderstand my words. However, if I gave an example, we came to a result with the help of the whole class and the students could understand. For example, when I was discussing alcoholism, I first wrote the word alcohol on the board. Then, on the right side of it, I wrote we should drink alcohol, and on the left side, I wrote we shouldn't drink alcohol. I tried to give reasons for each of the statements, and consequently, came to the result that we shouldn't drink alcohol. Meanwhile, someone might crop and share the part in which I said we should drink alcohol because of these reasons. Well, that's a pretty kettle of fish! Coz here's another nice mess you've got me into. All in all, I had to censor my words a bit so that it didn't become too

bad for me in cases of sharing my words with the third parties" (P2).

Theme 2: Cold and soulless education

Lack of emotional climate and social interactions and the lack of live and dynamic interactions were described by participants as the most important weaknesses of e-learning, compared to face-to-face learning.

Sub-theme: Lack of emotional climate and social interactions

Based on the participants' experiences, a considerable decline in students' motivation for learning, lack of emotional interactions, and students' lack of modeling classroom behaviors resulted in a lack of emotional climate and social interactions during e-learning. Participants described their experiences in this regard as follows:

"…We always say that there is also implicit learning in the classroom. This means that the students, in addition to what they've been taught in the classroom,

can unconsciously learn from the teacher and their classmates' behavior. In other words, they learn a lot from the interactions provided in face-to-face learning. However, there aren't such things in e-learning" (P5).

"...In the class, we can increase the durability of the students' memory on the provided content by creating appropriate interactions and using different strategies for improving students' motivation. To do so, we can use emotional interactions and tell memories and stories about the cases of different diseases. However, we were not able to do this in cyberspace due to the uploading limits in the online education system" (P11).

Sub-theme: Lack of live and dynamic interactions

Participants described one-way communication, lack of mutual recognition between the lecturers and students, reduced group interactions, and low liveliness compared to face-to-face learning as the weaknesses of asynchronous e-learning. One of the participants described his experiences in this regard as follows:

"...Currently, there is no lively class like the one we used to have before and we've been like a newscaster. Unfortunately, we just have one-way communication. I ask my students a few questions during the class and believe me, none of them answer my questions! This makes us show little enthusiasm. The process of teaching and learning is a two-way interaction; however, we've realized that there is an interruption in this interaction by which both the student and lecturer have been harmed" (P3).

Theme 3: Low efficiency in clinical education

Based on the participants' experiences, the tendency towards abstraction and theorization in online classes and the deficiency in gaining clinical experience were associated with the low efficiency of e-learning in practical/clinical courses.

Sub-theme: Tendency towards abstraction and theorization

Participants described e-learning as an inefficient method, compared to the routine method of clinical education. The reasons for this included the tendency towards theoretical orientation, the difficult understanding of the process of performing practical skills, and low flexibility in practical/clinical courses. Participants described their experiences in this area as follows:

"...E-learning is more of a lecture and has a theoretical framework. So, it's not a good way to teach practical and clinical courses, especially in medical sciences, and it's literally impossible to learn practical skills in this way" (P9).

"...Nursing is a major in which you need to learn practical skills. I mean I have to work in a real clinical situation to master practical skills. Otherwise, I can't be a real nurse even if I study a lot of nursing books

without learning clinical skills. The students need to visit patients, provide bedside care, do a physical examination, take a medical history, and establish good communication in clinical settings. We seriously have fundamental problems in this regard" (P2).

Sub-theme: Deficiency in gaining clinical experience

Based on the participants' experiences, the lack of clinical interactions, lack of knowledge of real nursing situations, lack of experience of stress caused by the provision of patient care in clinical settings, non-repeatability in performing procedures, and the impossibility of learning practical skills were described as other weaknesses of e-learning in clinical nursing education that could lead students to have a deficiency in gaining clinical experiences. Participants stated their experiences in this regard as follows:

"...Nursing students receive training on clinical practices in a skill lab, but the stress caused by the provision of bedside care is different from the one they encounter in the skill lab. In other words, the skill lab is a semi-virtual hospital. The students practice some skills on medical training manikins. For example, they insert an IV catheter, while they know that the procedure doesn't cause any pain to the manikin. The skill lab is a real simulated learning environment, but the truth is that practical learning doesn't happen in the skill lab as the way it does in a real clinical situation. In a real clinical situation, students experience higher levels of stress because patients are agitated and their attendants are present there. Besides, the ward atmosphere is strained. Which of these conditions does exist in online education?!" (P4).

"...Just imagine that I want to have an online clinical course for my students. I have to make a video clip on how to insert an IV and upload it so that my students can watch the video on the online education portal. I think this is not clinical education. The students will not become efficient nurses. Through this method, the students might be nurses who only have good theoretical knowledge, but when it comes to a real clinical situation, they will definitely run into difficulties" (P12).

Theme 4: Insufficiency in the educational assessment process

Based on the participants' experiences, poor-quality educational assessment and failure to provide appropriate conditions for taking the examination indicated a major gap and challenge in conducting correct mid- and end-of-semester assessments reflecting the students' true knowledge and skills.

Sub-theme: Poor-quality assessment

Participants considered items, including the lack of an efficient evaluating system for student assessment, incomplete student assessment, and

perfunctory exam-taking as clear indications of an insufficient educational assessment process. Participants shared their experiences as follows:

"…We didn't and don't have proper assessment systems to know what our students do on the other side of the line. We had a problem with the assessment module of the online education system. Every time we took an exam, the system had a problem in exam analysis and contained errors in this regard" (P9).

"…The students failed to acquire the depth of learning we expected. The assessments were deficient and we only took an exam as merely a formality" (P7).

Sub-theme: Failure to provide appropriate conditions for taking examinations

Participants expressed the probability of losing internet connection during exams and the possibility of cheating on exams as other weaknesses of asynchronous e-learning. In this regard, the participants stated that:

"…Slow internet speed and internet disconnection were the main problems that students complained about in their online exams. This made the students lose the time allotted to the exam or not be able to take part in the exam at all" (P6).

"…Actually, what I found was that the scores obtained by the students in this semester were much higher than those in the previous semester. This shows that there is a problem here. Students had more opportunities to cheat on online exams and they used group messaging apps to do so" (P8).

4.2. Strengths of Asynchronous E-Learning
Theme 1: Maintenance of safe education during the COVID-19 crisis

Participants stated safety protection, flexibility, and affordability as the e-learning advantages that promoted the opportunity for students to secure their safe environment and participate in educational programs during the crisis of the COVID-19 pandemic. This was considered to be the most important strength of asynchronous e-learning in nursing education.

Sub-theme: Safety protection

Participants described e-learning as an effective educational method for preventing the spread of COVID-19 and protecting the health of lecturers and students since this method reduces disease transmission and is consistent with social distancing. One of the participants stated:

"…During the COVID-19 crisis, the physical and mental health of lecturers, students, and medical staff, as well as the prevention of COVID-19 spread, are the main priorities. E-learning was the best approach at that moment because it not only led to the continuation of educational programs and activities but also kept employees safe from COVID-19 by reducing crowds" (P3).

Sub-theme: Flexibility

Participants enumerated the lack of space-time constraints, repeatability of educational content, greater accessibility, and shortened study period as the strengths of e-learning. They also emphasized the high flexibility of this method, compared to face-to-face learning. Some participants shared their experiences in this regard as follows:

"…We didn't limit education to office hours only. Online classes were not rigid like routine classes. In the so-called regular weekly classes, I was only allowed to hold one session. However, I could hold two or three online sessions in a week if I considered enough time for the students to access the content of the sessions" (P11).

"…One of the most important strengths of e-learning was that students could access educational content at any time and place. Besides, they could listen to the audio file of online classes as many times as they wanted. It was not like a face-to-face class, which was held once and then finished" (P5).

"…E-learning helped shorten the students' study period and it could have been more pleasant for them!" (P1).

Sub-theme: Affordability

Since e-learning could reduce commuting expenses and save time and energy, participants considered it an affordable method of education, especially during the unfavorable economic conditions caused by the COVID-19 pandemic. One of the participants described his experiences in this regard as follows:

"…This method of learning allowed students and lecturers to enthusiastically and patiently perform the teaching-learning process at the right time. There was a time constraint during face-to-face learning as the clinical courses were held in the morning and the theoretical classes were held in the afternoon. This was really difficult for both the lecturers and students. On the other hand, the commutes and expenses associated with attending theory classes were minimized" (P2).

5. Discussion

During the COVID-19 crisis, like many other organizations, academic institutions were forced to hold all classes, meetings, and other face-to-face events in an online environment to ensure the safety of staff and students. The adaptation to this sudden change was not simple for those individuals who were not familiar with the complexities of e-learning and might increase their workload and stress (21). The themes extracted from the data analysis were an attempt to achieve the main objective of the study, namely to search, discover, and explain the strengths and weaknesses of asynchronous e-learning in nursing education throughout the COVID-19 crisis. After data analysis, it was concluded that the themes

of "low quality of educational content", "cold and soulless education", "low efficiency in clinical education", and "insufficiency in educational assessment process" were the weaknesses of asynchronous e-learning. In contrast, the theme of "maintenance of safe education during the COVID-19 crisis" was the only strength of this learning method in nursing education during this period.

The low quality of educational content pointed to the lack of an established protocol for creating educational content and the greater caution of lecturers in expressing and conveying the content due to concerns about the legal burden. One of the reasons for this can be the lecturers' lack of experience in confronting the sudden shift in the educational approach from face-to-face learning to e-learning. Furthermore, the lack of accurate and standard policies and protocols for the preparation of e-learning content can be another reason for the low quality of educational content in the online education system. Addressing this issue requires a change in the dynamics of organizational practice to enhance the capabilities of faculty members and develop protocols on how to create e-learning content (21).

Based on the participants' points of view, cold and soulless education following the reduction of social and dynamic interactions was found to be one of the most important shortcomings of asynchronous e-learning, compared to traditional classroom learning. The study participants perceived the lack of face-to-face interaction to be one of the most important e-learning challenges (22) that can lead to professional isolation and reduced learning experiences (23, 24).

In the present study, the lecturers described the atmosphere of online classes as being dull, cold, and soulless, part of which can be partially addressed by establishing synchronous e-learning. One of the particular weaknesses of e-learning that can disrupt the student-instructor relationship is the loss of direct communication and interpersonal contact as this issue can be a barrier to learning and slow down the teaching-learning process (25). It has been indicated that 51.2% of lecturers believe that the lack of direct communication between lecturers and students has a negative effect on the students' motivation (26).

Low efficiency in clinical education following the tendency toward theorization and the deficiency in gaining clinical experiences was described as another weakness of asynchronous e-learning in nursing education from the lecturers' viewpoints. Since face-to-face learning was impracticable during the COVID-19 crisis, it was impossible to present the practical courses that required physical presence and practical understanding of the students in the skill lab. The maintenance of standards in medical education and clinical learning and the minimization of assessment deficiency are unprecedented

challenges during the COVID-19 pandemics (27). Although nursing students do their theoretical courses in the university, the major part of their time is spent passing clinical courses (28). Meanwhile, many theoretical and clinical courses are influenced by social distancing rules due to the COVID-19 pandemic (29). Practical and clinical courses are primarily designed to ensure students' clinical competence. Such skills and experiences cannot be optimally acquired without a supervised interactive experience in a clinical setting (30).

Insufficiency in the educational assessment process was described as another weakness of asynchronous e-learning in the COVID-19 crisis. This weakness resulted from poor-quality educational assessment and failure to provide appropriate conditions for taking examinations. Based on the lecturers' viewpoints, it was not possible to make a standard assessment of the students' depth of learning in the current online education system and it seemed that the depth of learning decreased in this learning method. Possible technical difficulties and increased probability of academic dishonesty among students are significant issues resulting from the use of electronic exams, which in turn threaten the validity of an exam (31). Furthermore, distance electronic exams pose challenges related to the difficulty in assessing knowledge and practical skills, all of which can affect the achievement of learning goals (32).

E-learning has helped observe social distancing requirements by reducing the commutes of students and lecturers, and consequently, has led to the maintenance of safe education throughout the COVID-19 crisis. Online learning makes it possible for students to learn whatever needs to be learned at any time and place (33). In a study conducted by Thomson, the degree of flexibility, attractiveness and importance of virtual education was analyzed in the students who were enrolled in the virtual education course (34). The existence of such positive aspects in e-learning prevents the COVID-19 crisis from stopping teaching-learning processes.

5.1. Limitations and Further Research

This study only explored the experiences of Iranian nursing faculty members in the area of asynchronous e-learning. Despite the fact that the qualitative researchers are not concerned with the generalization of the results due to the nature of qualitative studies, it is recommended to conduct similar studies in other contexts .In addition, this study was short-term research. Prolonged engagement with the study subjects can clarify new dimensions of the strengths and weaknesses of e-learning. In addition to the experiences of nursing faculty members, students' experiences are suggested to be explored, through which the strengths and weaknesses of asynchronous e-learning can be

revealed from different angles.

6. Conclusion

Based on the results of the present study, asynchronous e-learning was revealed to have numerous weaknesses in the area of nursing education. However, the protection of individuals' safety and health and maintenance of academic activities and education constituted the major strengths of this method throughout the COVID-19 pandemic.

Protection of the health and safety of lecturers and students is certainly essential in the current situation, and the education process should be conducted with minimum risk; however, all efforts should be made to minimize the shortcomings of e-learning. Nursing faculties should lead lecturers to create and provide better educational content by developing comprehensive and standard protocols, modifying the electronic assessment method, developing guidelines to improve the quality of the student assessment system, and combining current learning methods with the synchronous ones (e.g. online classes that are held live or in the form of webinars). The above strategies can reduce the coldness and dullness of asynchronous learning by creating a dynamic learning environment.

Acknowledgments

Footnotes

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