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A Review on Different Virtual Learning Methods in Pharmacy Education

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ABSTRACT

Virtual learning is a type of electronic learning system based on the web. It models traditional in-person learning by providing virtual access to classes, tests, homework, feedbacks and etc. Students and teachers can interact through chat rooms or other virtual environments. Web 2.0 services are usually used for this method. Internet audio-visual tools, multimedia systems, a disco CD-ROMs, videotapes, animation, video conferencing, and interactive phones can all be used to deliver data to the students. E-learning can occur in or out of the classroom. It is time saving with lower costs compared to traditional methods. It can be self-paced, it is suitable for distance learning and it is flexible. It is a great learning style for continuing education and students can independently solve their problems but it has its disadvantages too. Thereby, blended learning (combination of conventional and virtual education) is being used worldwide and has improved knowledge, skills and confidence of pharmacy students.

The aim of this study is to review, discuss and introduce different methods of virtual learning for pharmacy students.

Google scholar, Pubmed and Scupus databases were searched for topics related to virtual, electronic and blended learning and different styles like computer simulators, virtual practice environment technology, virtual mentor, virtual patient, 3D simulators, etc. are discussed in this article.

Our review on different studies on these areas shows that the students are highly satisfied with virtual and blended types of learning.

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Introduction

There is a need to revise the conventional learning style which is based on teachers, student presence in a class, limited time and space of the sessions and relatively high cost of this method of education (1). Shortage of qualified teachers and lack of funding for the expansion of educational opportunities are some of the reasons that some students do not learn as much as they should be (2, 3).

Due to the limitations of conventional education and the growth of information technology and electronic gadgets; and also the need for career-long education the idea of alternative methods of learning, like electronic (e)-learning and supplement based learning have been brought up (4-6).

E-Learning refers to active training via the use of electronic media and information and communication technologies. The receivers are connected through electronic means (numerous types of media that deliver text, audio, images …) (7).

Internet audio-visual tools, multimedia systems, a disco CD-ROMs, videotapes, animation, video conferencing, and interactive phones can all be used to deliver data to the students (4, 8).

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E-learning can occur to the classroom. It is time savings with lower costs compared to conventional methods. It can be self-paced, it is suitable for distance learning and it is flexible. It is a great learning style for continuing education and students can independently solve their problems (5, 9, 10).

The disadvantages of e-learning include lack of social interaction between teachers and students, less control on the students and ease of cheating. Teachers don't have sufficient knowledge and experience to manage virtual teacher-student interaction and the students can't get immediate and direct feedback from their teachers. There is also the possibility of procrastination and the students should have good self motivations (11, 12).

Considering the disadvantages of both styles of learning and the need of clinical and laboratory training in some areas (e.g. pharmacy education), it is more suitable if e-learning is used in conjunction with face-to-face teaching. This is called blended learning and is commonly used (13, 14).

Educational systems can benefit from the advantages of both styles. The quality of face to face education, electronic features, functionality, flexibility, emphasis on self-control of electronic features and control over time, space, path or pace of learning (2, 15).

Blended learning can occur to different settings depending on the students' needs. All kinds of lectures, workshops, training, online collaboration and simulation based training methods with the aid of multiple communication devices can be used (16).

There is a growing trend of replacing conventional styles with blended learning and virtual learning in medical education. One good system of education is via computers assisted learning (17, 18).This method encourages students to use computer technology, and will result in active and independent self-learning and independent learning. This style has become increasingly popular (19).

The purpose of this study was to review the methods used in the area of pharmaceutical education and different learning styles including virtual education.

Methods

Databases like Google scholar, Pubmed and Scupus were searched for topics related to virtual, electronic and blended learning. The search was not restricted by time of publication. Key words used for this review were: virtual learning, e-learning, blended learning, online education, computer mediated communication, online education, virtual patient, computer simulators, virtual practice environment, pharmacy education, distance learning and internet mediated education.

Results

120 articles (in Persian and English) were reviewed and 85 of them were suitable for our study.

Below we review different methods of virtual learning systems used in pharmacy and medicine education.

Computer simulators

Computer simulators are one of the novel computer technologies used in various schools (20).

Simulation based medical education (SMBE) is a method in which computer simulators are used to deliver knowledge and skills to the students (21).Today, computer simulators and intelligent robots have been marketed to improve medical education (22, 23).

Success rate and the effectiveness of virtual learning in medical education had been assessed by several studies. The results showed that a combination of virtual and traditional methods has a better outcome compared to traditional methods (24).

A study was done to evaluate the effects of computer simulations on teaching pharmacotherapy and pharmacokinetics to the pharmacy students. The participants were divided into two groups. Group 1 were taught by conventional style and group 2 received methods of conventional education combined with computer simulations. The results showed that in group 2, the improvement of knowledge of pharmacotherapy and pharmacokinetics was significantly higher than group 1 (25).

Amazingly, blended learning has been also used for laboratory trainings. One study evaluated pharmacy students taking virtual and real sessions on applicative microbiology and compared them to a group which only had routine sessions. At the end of the program the blended learners had higher scores and were more satisfied with their education compared to the other group (26).

3Dimensional (3D) simulators

3D simulators are designed according to the real environment. They provide a virtual environment for the students to improve their interaction techniques with the patients. This method presents different conditions that health care teams encounter. The students are able to ask virtual patients about their medical history and symptoms, the simulator is able to respond to these questions on various scenarios. Some of these simulators are connected to the internet so the virtual patient can find suitable answers to the student's questions (27).

In a study which evaluated 3D simulators used for teaching communication skills to pharmacy students showed that this method has improved their skills, reduced medical errors and provide a low-risk environment for repeated courses. The students were highly satisfied with this learning style (27).

Another study evaluated two groups of students, learning pharmacology through two different methods; 3D and 2D simulators. The 3D simulator groups had

significantly better results and satisfaction and were enthused to learn via this method in future (28).

Virtual practice environment (VPE) technology

VPE is a virtual educational environment designed in 2008. In VPE technology, videos and images of counseling and working at a pharmacy are displayed. Videos of daily activities at pharmacy are recorded and played on three 10*3 m^2 screens. The real environment sound of the pharmacy can be heard in the background and students can hear how the instructor offers medication counseling. Then they role play the situation. VPE technology can record the students' performances. Also, the students have access to internet and to use databases that will come in hand for their learning. At the end of each session the recorded videos are given to students so they can evaluate their strengths and weaknesses (29).

A research on pharmacy students showed that VPE technology can improve students' medication counseling and communication skills (29).

Virtual mentor

Virtual mentor is an integration of face-to-face and virtual learning that is rapidly becoming a universal teaching method. This method requires internet chat rooms and email services. Other names for this method are: Internet mentoring, Online mentoring, Electronic mentoring and Computer-mediated mentoring (30).

Many American educational institutions applied virtual mentor method of their apprentices and believe that the method has been effective for their learning (31).

It is obvious that the Internet is a requirement for virtual mentor method and has a key role. The studies have reported that the virtual mentor method can substitute conventional education and when there is lack of human resources (30). It is a novel teaching method and there are few studies on its effectiveness (32).

Adding effective monitoring and quality improvement are needed for this method (33).

The studies show that in terms of interaction, virtual mentor has positive effects on the students that have to be educated from a distance (34).

By electronic mentors students have more opportunities for academic achievement (35).

A research on virtual education and its effectiveness showed that due to lower costs, easier management, and no time or space limitation, the virtual mentor can substitute conventional methods. This method can be used for worldwide and continuing learning (35).

Virtual patient

Virtual patient is simulated by software based on a scenario of a real patient. It is also called: Pseudo pattern, Pseudo patient, Standardized patients, simulated patients, Pseudo customer, Covert participant, Shopper patient, and disguised shopper (36-40).

With this software, the patient is introduced and the main pages of the program include interview, patient medical history, physical examination, differential diagnosis, diagnostic studies, treatment, and discussion. On the interview page, the student asks questions and the database provides answers. On physical examination pages, a part of patient´s body is chosen, and then the student can choose one of the options on inspection, auscultation, percussion and touch. Then the students are required to make differential diagnosis. Laboratories and imaging findings are also available. Finally, they go over the results and make a final diagnosis. They fill in the patient´s treatment page and write a summary on discussion page (41, 42).

The virtual patient can be used in different fields such as nursing, pharmacy, and medicine. Also, it can be a useful innovation for teaching inter-professional communication skills to the students (43-45).Another use of the virtual patient simulation is to improve clinical and communication skills (46-49).

Several studies have shown that applying the virtual patient program results in increased knowledge of pharmacists (46, 50).The virtual patient simulation is a valuable and reliable technique for teaching and learning in advanced levels (51-53).The European Union started using this technology in 2000 and at present it has expanded across the union (43, 54, 55).The virtual patient program uses real scenarios and the same time it provides a safe environment for learning and leads to more confidence in pharmacy students (56, 57).

Communication skills for pharmacists include the pharmacists' ability to interact with patients and families, colleagues and healthcare providers through active listening, having sympathy for patients, problem solving skills, and awareness of cultural issues (58).

Various studies have shown that a good pharmacist communication with patients leads to improved medication therapy. Effective communication skills are necessary for pharmacists (as defined by WHO, 10 years ago), thereby, schools offer courses to improve this skill (59-62).

The students can practice effective communication skills via virtual patient programs and get prepared for real settings. (63) This program actively involves them. It might have its faults or defects, but it provides increased confidence in students to interact with real patients (55).

Another advantage of the virtual patient for medication counseling is its ability to demonstrate different mental and emotional statuses of the pharmacist and patient (e.g. anger or anxiety) (64). It is also shown that this method is superior to other evaluation programs when assessing the pharmacists' critical thinking skills (65).

The standards of the virtual patient simulation are improved to increase the validity of the technique (66).

In past two decades virtual patient programs have been effectively used for clinical education and assessment of students (67, 68).

It is believed that using computer simulations, improves learning based on effective problem solving and broadens students' experience of establishing contact with patients, although their real-career enhanced clinical skills should be monitored as well (69, 70).

In one study the participants were assigned to two groups. Group 1 were taught using lectures (conventional method) and group2 received a combination of lectures and virtual patient simulation. The results of the final scores of the two groups showed that group 2 had more improved problem solving skills than group 1 (71).

Virtual education in the field of Medication Therapy Management (MTM)

MTM provides pharmacists to be in touch with patients and enables them to give advice and practice good patient education. The aim is to ensure the proper use of medications, preventing drug side effects, practice of evidence-based use of medications, and providing patients with information about the cost and benefits of their medications (72, 73).

Due to the importance of MTM, a virtual technology for educating the students on this area is very helpful. This program should be able to provide required information about medications and various diseases (74).

In one study pharmacy students attended four virtual MTM sessions for patients with diabetes. The training improved their knowledge and confidence (73).

In another study evaluating MTM services, 509 patients received counseling from students on the phone. The results showed that after the patient counseling, 88% of the patients had better compliance for their drugs. An effective program should provide various patient cases for students, offer recommendations on medications in the area of guideline-based therapy, and teach them to establish an effective communication with patients (56).

At present, different types of MTM teaching programs are taking place in various schools. Some apply lectures, or role play and online learning (75).

The Internet and Web

Web designers have used new methods which resulted in easier access of operators to data. The web users can be actively involved in data expansion. The managers of these websites need to provide an environment so the operators can develop it themselves. Web 2.0 services were originally introduced as the new generation of websites that could be appealing, practical, and expandable. Web 2.0 services are time savings and have strong user interface. These websites are developing in the health and medical fields. A study on web 2.0 showed that using these networks leads to increased distribution of knowledge of healthcare among university students. The technology should not be the core part of the education; however, it can be used as a supplement to in-person classes (76).

The invention of the internet and web was an inflection point and all around the world and has affected almost every aspect of our lives. There are still a lot of unknown potential. In the pharmaceutical field, the internet can be used for marketing, rational prescription of drugs and prevention of and drug side effects (77). Over the past decades, the pharmacists transmitted their knowledge and skills via face-to-face communications, which was limited to time and place. In recent years, the internet has overcome the obstacles to communicate free of distance and time issues and resulted in an international interaction among pharmacists. This improved interaction between pharmacists has a positive effect on their career, experience, and learning (78).

Other electronic means of medical education

Emails and audio / video tapes can be used for medical education (65, 79-82).Today, these resources can also be used for public health education. Due to the new roles of pharmacists in general health, pharmacists are required to be acquainted with the virtual education to transfer essential health messages (83).

One study evaluated the attitude of faculty members of a pharmacy school towards Ipad tablet technology. The results showed the majority of the faculty members used tablets to communicate with students, write papers, and prepare oral presentations and resulted in improved efficiency of them (84).

Virtual communication leads to improved knowledge with faster data transfer through offering various resources and information sharing. Even a simple cell phone can be used to connect to a pool of information. It should be added that overall, the majority of students and faculty members have a positive attitude towards novel teaching methods (85).

Conclusion

The results of various studies show that the virtual education is an effective way to improve knowledge and skills of pharmacy students. Although it is not a substitute for traditional/ conventional methods of learning, it can be used in combinations to the current style of education to improve effective learning. Simulators present high quality real-like environment which is safe and satisfying for learners. The students will receive virtual education prior to real interaction with real patients. Due to the fact that the simulators reduce costs and increase the pace of learning, many educational planners have a high interest in them. Also, blending different teaching styles improve the students' participation in the course and high satisfaction rates.

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