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Investigation of Blended Learning Components in Medical Education

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ABSTRACT

Objective: The focus of this article is on blended learning in medical education, including its components and implementation.

Methods: The research method used is a descriptive-analytical review, with content sourced from books and articles. The article aims to elucidate the concept of blended learning in medical education through implicit knowledge. The integration of information and communication technology in education has resulted in the adoption of blended learning environments.

Results: Blended learning involves utilizing multiple teaching methods, strategies, techniques, or media to deliver educational content and materials. It has been proposed as the second wave of e-learning and is a new approach in educational planning that combines electronic and face-to-face equipment, as well as student-centered and teacher-centered methods. This approach seeks to combine cognitive learning principles and social constructivism, bringing together informative, enabling, and creative education systems. The use of blended learning strengthens learners' activities by incorporating problem-solving and questioning methods through group interactions and healthy competition within a dynamic structure.

Conclusions: This study discusses the concepts, foundations, methods, and advantages of blended learning in electronic education. The use of blended learning can promote and expand innovative teaching-learning approaches, particularly in the face of emerging epidemics such as COVID-19.

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Introduction

One of the important goals of medical science education should be the education and training of students in the fields of learning, personal growth and development, increasing self-confidence and social development as a field of social sciences and humanities and helping their fellows more and more effectively. Several factors play a role in the effectiveness of education and the realization of learning through teaching, one of which is the role of teaching methods used by professors. All medical science lecturers are diligent in training human resources in their own way, but what is important is that lecturers think about their experience and focus their thinking on student learning, so that if they had the chance to teach again, ask themselves what to do to improve the quality of education and implement it in a different way. Education is a complex process, especially for fields of medical sciences whose graduates are prepared for the patient's bedside, in addition to using different methods of education, giving importance to communication, which is among the priorities of basic concepts, and students of medical sciences must learn it. It is essential. In addition to the training of skilled and specialized human resources, one of the other important goals of the medical science education system is to improve learning skills. With the spread of the Corona virus in the world and the epidemic of the Covid-19 disease, the need for the use of blended education was strongly felt.

The process of medical education is influenced by many factors and variables. Students, professors, the field of education, educational methods, educational resources, the growing trend of educational technologies and electronic learning are among these factors. Responding in time to the increasing changes in new technologies and the correct guidance and management of educational programs in the age of information and communication can, on the one hand, provide the reasons for the up-to-datedness of students, and on the other hand, having a skilled graduate as the output of the medical education system, it will lead to more health benefits for the society (Ruiz et al., 2006). The coronavirus pandemic has caused the most rapid changes in higher education around the world, forcing face-to-face teaching to be abandoned. This has caused almost immediately the education of higher institutions to become distance and virtual learning. The Corona crisis pushed the attention of all educational environments such as universities, schools and organizations for electronic education alongside face-to-face education, but the quality of electronic education and its results, i.e. learning and academic motivation, should also be

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considered. The nature of educational materials in various fields of medical sciences is such that the use of multimedia facilities is necessary to facilitate the learning of learners (Nasiri et al., 2014).

With the introduction of new communication technologies in the field of education, the blended approach has been more attention. The learning process is too complicated to be limited to the classroom space. Recent studies suggest that the combination of face-to-face training and electronic training method provides a more flexible method of training. The efforts of some creative teachers in using new technologies in educational activities, and examining its effects on the outcome of students' learning, is proof of this claim (Ottosson, 2003). Today, one of the revolutions in the field of education is the new information and communication technologies that have made it possible to exchange information and establish communication for the face-to-face education system at a distance and have continuously changed teaching and learning so that which has encouraged the educational systems that used only an independent approach of face-to-face education, or the distance education system, to turn to a blended education system. Nowadays, blended learning is one of the topics that is discussed with great enthusiasm. In fact, the blended education system makes educational professionals think about the entire teaching and learning conditions, and in this way, consider the human element in education as a vital element in any type of technology-based intervention. Blended learning can increase responsiveness to learner needs through the conscious choice of online or face-to-face intervention strategies (Tabasi & Saeedpour, 2010). In the blended method, education takes place with a holistic attitude towards the learner, and as a result, taking into account his individual characteristics, including his attitudes, beliefs, views, amount of knowledge, skills and mental abilities (Derntl & Motschnig-Pitrik, 2005).

The field of medical education, as a part of higher education, which is required to provide a large amount of knowledge, attitude and skills to students to acquire job qualifications, is not exempt from this rule and is required to use modern methods. A review of research institutions and universities such as Stanford University and Tennessee University about blended learning mechanisms in the field of medicine provides relevant information to those interested. These researches state that blended learning is preferable to traditional methods. They also ensure that blended learning not only has the ability to transfer learning materials more efficiently, but is also a more effective educational method. Since hybrid education can provide the advantages of both

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traditional and virtual methods, it is considered a suitable method to achieve teaching-learning goals in medical education. In the process of education, teaching and learning are interdependent. Although teaching is the teacher's activity, the result of learning is aimed at the student, so the effectiveness should be examined from both the student's and the teacher's points of view to show more complete results.

Although a number of researchers have investigated the situation of blended education and compared the existing problems, there has been no research on the dimensions and effectiveness factors of blended education.

The need to learn through new methods to improve knowledge is a basic need to acquire clinical skills in medical education. Considering the special nature of medical professions, it is necessary that the students of this profession have a real understanding of the content of the requirements in order to be able to apply the acquired knowledge in specific clinical situations. And the need for learning through new methods and its application in improving the knowledge and skills of patient care and paying attention to the issue that long-term learning is a basic need for acquiring clinical skills or abilities It is very important. Various studies have shown the beneficial effect of learning through the use of virtual systems for teaching different medical subjects. Medical science professors have always faced challenges in training students to become professionals that lead to the creation of deep knowledge and decision-making skills. Although electronic learning methods cannot completely replace Let it be the teacher's opinion, but using electronic learning methods in combination with the usual methods, it facilitates the teaching-learning process in medical education and will respond to the rapid and continuous change in the field of science and knowledge and the needs of students. Researchers believe that blended learning can reduce the gap between learning practical and theoretical content. Also, researches have shown that blended learning is more effective than traditional and electronic methods alone. Due to the fact that medical education centers have always been looking for educational methods that are more efficient and effective compared to other educational methods, and on the one hand, since the blended education with respect to the side Human factors are mostly the negative points of education has eliminated the virtual and provided the possibility of benefiting from the advantages of both traditional and virtual methods, it can be a suitable method to achieve the goals of medical education with better efficiency and effectiveness. Blended education is actually a combination of

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two or more methods that, in addition to using face-to-face classes, uses other educational methods such as multimedia courses, seminars, and electronic education capabilities (Garrison & Kanuka, 2004).

Material and Methods

This article is a descriptive and library review. In order to collect information relevant to the purpose of the research, from search engines and reliable databases such as ScienceDirect, Scopus, Magiran, IranMedex SID, and Noormags and library studies and searching in books, theses and published scientific articles, with the keywords of blended learning, electronic learning, Blended learning has been used, and during this process, 92 sources related to the topic of blended learning and its related concepts were found in the period from 1990 to 2023, but due to the huge overlap of the sources with each other, the sources were analyzed and then summarized. The outputs of previous studies were extracted.

This article comprises a descriptive and library review. To gather pertinent information for the research's objectives, various reliable sources such as ScienceDirect, Scopus, Magiran, IranMedex SID, and Noormags were utilized, alongside library research encompassing books, theses, and scholarly articles. The exploration focused on keywords like blended learning, electronic learning, and their applications. A total of 92 relevant sources spanning from 1990 to 2023 were identified. However, substantial overlaps among these sources necessitated a thorough analysis and subsequent summarization. The findings of past studies were then extracted.

The prevailing method utilized in this study is descriptive-analytical. Within this study, the technique of conceptual analysis was applied, with the aim of elucidating the concept of blended learning in medical education by focusing on implicit knowledge. This approach involves the examination and reinterpretation of the concepts integrated into a novel framework (Seif, 2023).

Results and Discussion

Face-to-face training: Face-to-face training refers to all the activities that are planned by the instructor in order to facilitate learning with an individual approach to teaching and learning, and flow between the instructor and one or more learners in the form of interaction. This approach has a strong background and relies on tried and tested methods, designs and tested curricula. Face-to-

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face training is based on mechanical devices and takes place in real environments. It has the limitations of this environment and these tools. In general, face-to-face education is followed in a linear, systematic, focused way, without producing content in the teaching-learning process and based on common methods in lesson planning books, and most importantly, this approach does not follow the pattern of lifelong learning in the minds of learners. Therefore, this one-dimensional educational method requires a careful review by educational professionals (Hemmati & OmraniSarav, 2009).

E-learning: Simultaneously with the rapid changes in techniques and skills and the emergence of new phenomena in information and communication technology and their impact on ways of living, the education process, which is one of the fundamental pillars of societies, has undergone a change that independent learning opportunities, teaching styles. And it has provided content design in various ways. This new approach is more flexible and learner-oriented, unlike the traditional approach of learning and teaching which was teacher-oriented. Acquiring electronic learning skills can enable the use of new knowledge for medical students, and medical schools can be founded around the use of such skills and knowledge. According to the studies carried out in medical schools, the most important concern of medical education officials in the world is to use all their power to provide an efficient and effective connection between what they learned during the theoretical period and the field of work for medical students, which is It is provided through e-learning at any time and place. Considering the requirements and needs of learners in the design and planning of e-learning courses, in order to organize information according to the obtained categories, one of the necessary and important strategies to increase the quality of e-learning courses is the use of educational design and the use of related patterns, so that e-learning courses can be designed according to the correct educational needs of learners and through the application of the correct principles of educational design, the use of educational design strategies in order to solve problems and improve the quality of e-learning in medical education is an important step towards providing Better services were considered in medical education and motivated learners to engage with the content and benefit from the electronic learning environment based on their needs and according to their interest. The result of Badali et al.'s research (2021) about electronic education on the learning rate and academic motivation of medical students in Corona conditions showed that the use of electronic education in Corona conditions can be effective in increasing the

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learning rate and academic motivation of medical students. The qualitative study of Aziz et al. (2020) in the year of the peak of Corona in order to discover the effects of this disease on medical education with regard to virtual education, presented two themes of virtual education methods and challenges on the way of virtual education. In connection with the virtual education method, it is better to use more user-friendly methods in the medical curriculum, and it is also necessary for students to learn online methods. And thus, in the study of Babazadeh et al. (2022) with the topic of investigating the factors affecting the quality of virtual learning and training from the perspective of dental students of Zahedan University of Medical Sciences, it was stated that the teaching method is using videos recorded on webinars and webinars on file. Audio is preferred. The results of Sajedi et al.'s research (2021) regarding the design and validation of the conceptual model of e-learning in universities of medical sciences showed that in order to design e-learning in universities of medical sciences, it is necessary to consider the dimensions of universities, study areas, national-macro and regional dimensions - International should also be considered (Sajedi et al., 2021).

Blended training: The current trend towards blended learning may be the trend towards training and skills in the use of technology. Blended learning is a relatively new term, but its concept has been around for decades in areas such as virtual education (Akkoyunlu & Yilmaz-Soylu, 2008).

In general, the term blended learning refers to the third generation of distance education systems, which is described as a method to maximize the benefits of face-to-face education and multiple technologies for learning. This type of learning is a thoughtful integration of electronic learning and face-to-face learning. This method is used to optimize learning results and cost effectiveness. The purpose of blended learning is to provide opportunities for students to use both real and virtual space for better learning. Since hybrid education can provide the advantages of both traditional and virtual methods, it is considered a suitable method to achieve teaching-learning goals in medical education. In the process of education, teaching and learning are interdependent. It was also shown in other studies that it is a leader in comprehensive blended education and due to the possibility of repeating the educational program, the effectiveness of education becomes much higher. Other research results show that in blended education, students have more control over the speed and flow of their learning and by choosing the right resources and metacognitive processes such as time management, they reach their goals sooner (Teräs & Kartoğlu, 2017).

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Garrison and Vaughan (Vaughan & Garrison) have defined blended learning as a thoughtful integration of electronic learning and face-to-face learning. Blended learning is also called hybrid or blended learning, and there are generally several definitions of this term. The encyclopedia of science and technology has also mentioned blended learning as an approach that combines different educational methods such as online learning and traditional (face-to-face) learning.

Although hybrid education is somewhat close to the slogan of the day under the title of teamwork in higher education institutions, there are still many ambiguities regarding the meaning of this term (including distributed learning, electronic learning, flexible learning and mixed course units during application, its difference in There is native literature and the assumptions behind it. Blended education can be defined in different ways, in essence, blended learning is a thoughtful combination of face-to-face and virtual learning experiences Its traditional activities also deal with the possibilities and expectations of technology. Blended learning allows teachers to have a balanced presence in face-to-face and online classes. Also, this approach provides tangible and multi-purpose design options beyond traditional classroom options. (Tabasi & Saeedpour, 2010)

In blended education, different methods such as traditional classrooms, online education and self-directed education are blended. Based on this, blended learning is referred to as the best solution for achieving desired goals and learning quality, using blended learning. Also, this method uses interactive and learner-centered teaching based on communication methodology and constructivism and forms of formative and summative evaluation to provide a logical response to the different needs of learners in accordance with their individual differences and learning styles. In the clinical fields of medical education, the blended method is better than the traditional method and increases learning (Reeves et al., 2004).

Common media in blended learning: The common blended learning media that are used in order to adapt to the diverse patterns of learners or the pressures caused by their growing population and other limitations by shifting the communication time in different ways to provide content, teacher-centered support, peer support, or automatic support are: From: face-to-face interaction in trainings and seminars for teacher-centered support, content presentation, discussion and dialogue, practicing skills or informal communication in groups and individually, asynchronous computer conferences, synchronous conference, educational website, test and Online assessment for automated support, e-mail, web-based resources such as PowerPoint slides or digital multimedia,

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telephone support, digital audio and video, printed materials, digital presentation of lectures, video conferencing for presentation of lecture content, and other facilitation strategies (support), digital whiteboard and teleconference.

Advantages of blended learning

Blended education has many advantages, which we mention here:

1. Learning in special ways limits the richness of learning programs and the amount of knowledge transfer, while blended learning avoids this.

2. Blended learning not only has the ability to transfer learning materials more efficiently, but is also a more effective educational method.

3. Blended learning potentially saves money and improves people's learning program.

4. It provides the possibility of comprehensive development in the personal path, which is also in accordance with the comprehensive abilities.

5. It provides the opportunity to create creative, interactive standard educational packages tailored to the specific needs of each learner in line with the national curriculum, including additional support from the teacher for weak students.

6. It provides the possibility of simultaneous and asynchronous interactive-reflective communication through the design of blended learning.

7. Emphasizes the role of the teacher in the presence of teaching as a facilitator.

8. Reduces training time to a third.

9. In this approach, it is tried to pay attention to the collaborative and personal capabilities of face-to-face (teacher-centered) and virtual (inclusive-centered) learning, because the face-to-face classroom is collaborative before it is reflective, and its strength lies in self-motivation. which improves educational activities as social activities, if the virtual learning environment is reflective before being collaborative, and its strength is that it provides an opportunity for feedback and precision.

10. Increasing the level of learning due to quick feedback, the possibility of accessing resources and key and important points of the lesson, the possibility of accessing the lesson teacher, the possibility of following the lesson by the student himself and saving the student's time and the usefulness of the exams are some of its significant benefits.

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But along with the strengths and opportunities that result from the application of blended education, this education also faces threats and weaknesses:

The results of the Qanbari Khanqah and Moghadis Rostamnia study, which was conducted with the aim of investigating the knowledge and attitude and skills of faculty members of Gilan University of Medical Sciences regarding blended education, showed that the majority of faculty members (80.8 percent) have insufficient knowledge about education. have a combination.

But the big threat in establishing a blended learning environment is choosing the best combination that balances online and traditional learning. Chu Yeh et al. reported that there is no standard for selecting the appropriate combination, it all depends on the knowledge and taste of academic planners.

The teacher's attitude is also considered as one of the factors of success and failure in blended learning because the teacher's beliefs are closely related to teaching behavior and learning goals.

It should be acknowledged that the basis of any type of education is the knowledge of pedagogical aspects. In the pedagogical field, the principles of educational design, appropriate content production, effective evaluation, and learning strategies should be considered.

Graham also stated that the principle of using blended learning is to improve areas such as pedagogy and more interaction. Therefore, according to the above contents, blended education can be considered as a combination of three dimensions: pedagogical, methodology and technology (Akgunduz & Akinoglu, 2017).

The position of blended education in the field of medical education

Today, in the universities of the world, the approach of blended education has found a special place. So that the universities can use the principles of this approach to raise the quality of their education, which in turn will improve the effectiveness and credibility of the educational environment. Meanwhile, due to various reasons, medical education feels a greater need for this approach to achieve success, efficiency and satisfaction. Of course, it is necessary to mention that what causes the successful achievement of educational goals in blended education in medical fields is the logical arrangement of two components, face-to-face and online. According to the conducted research, the blended education system has been able to attract the satisfaction of teachers and students in terms of applying flexibility in the learning process and the ability to take advantage of both face-to-face and electronic education methods. In order to be more successful in this field,

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more attention should be paid to the aspects of increasing interaction and motivational methods in the e-learning sector of blended education. By applying the blended method in medical education, it provides freedom of action and wider insight in the use of educational tools and environments to educational experts. (Tabasi & Saeedpour, 2010)

Studies have shown that different countries, including the United States, Canada, England, Australia, and China, are pioneers in the use of electronic learning in medical education. In American medical schools, including Harvard, Columbia, Boston, and Michigan, medical courses (mostly basic sciences) are taught online. Effective efforts have been made in this matter at Manchester and Sheffield universities in England and medical schools in China (Sharpe et al., 2006). The correct integration of educational system, medical issues and electronic learning in teaching hospitals and clinical training of interns and assistants requires more attention of professors to work and education at the same time. With the expansion of the World Wide Web, the use of e-learning in medical education increased dramatically and created a potential capacity in the field of education and provided the possibility of creating an effective learning environment with immediate feedback related to the contents of education. Therefore, since 1997, the World Federation of Medical Education formed a committee of consultants for the use of computers in medical education and asked them to prepare a guide for the integration of this new tool with the educational program. This issue was accepted in many universities of developed countries and they initiated electronic communication between professors, students and the field of education (Grant, 2007). At Harvard University, Information Technology covers most of the curriculum. Basic sciences and pathophysiology and the chapters of the first two years are almost 80% electronically. In recent years, New York Medical University has placed electronic learning on the agenda of medical students. In the first year and medical preparations, students take courses such as biochemistry, physiology, neuroscience and behavioral science through the web. The University of Pennsylvania has prepared the four-year medical course electronically. Many courses are offered through the web. Evaluation of professors is also done through computer software (Masson, 2007). The Medical School of Sheffield, England, has provided a part of medical education online through the internal network and the global network in its Internet database, and it can be accessed with a user ID. (Kilgore & Wald, 2004).

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Medical fields consist of several special sections: the theoretical section of conducting seminars and lectures, the practical section and special clinical courses. So, some components can be replaced with electronic learning and traditional learning can be improved. The effectiveness of education is usually done by the degree of completion or achievement of educational goals. Also, the effectiveness of teaching is done by improving the performance of the requested activity. The results of education are the mastery of new educational content, which is measured by the ability to acquire knowledge31. Students of the medical department need many clinical skills that are difficult to replace with electronic learning, but theoretical concepts can be easily transferred by distance learning (Połjanowicz et al., 2010).

Blended learning is a new mechanism with an emphasis on diverse and extensive use of learning methods. The most important part of blended learning is the flipped classroom. The idea of this technology is that the main stages of the teaching and learning process, such as classroom activities and assignments, are reversed, which means that theoretical lessons are studied by students individually with the help of watching video lectures recorded by the teacher or downloaded from Internet websites. , while classroom activities are conceptually dedicated to performing practical tasks and discussing major issues and solving problems with the professor and other classmates (Huarng, 2015).

By taking advantage of the hybrid education approach, it is possible to use the advantages of both types of electronic education and traditional education. Blended learning with the advantages of both education approaches (traditional and electronic) is an effective approach to increase the effectiveness of learning, ease of access to educational materials and increase the effectiveness of costs. is. Also, due to the provision of different opportunities for learning, besides increasing the attractiveness of education, the individual differences of the learners are also given proper attention, because not all people learn in the same way, and for this reason, the use of different methods for teaching is essential to It seems According to the findings of the study, the blended method in education provides greater freedom of action in the use of educational environments to the educational experts and in this way it leads to the development and improvement of teaching and learning, so it is recommended that teachers use this method in their education. use (Yoon & Lim, 2007).

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Another advantage of blended learning is that the use of technology expands the physical boundaries of the classroom, provides access to content and learning resources, and improves the ability of instructors to receive feedback on learner progress. Blended learning also provides multiple opportunities for communication. , they provide cooperation, interactions and learning control (Rossett & Frazee, 2006).

Blended learning makes it possible to achieve the goals of training courses by using these multiple methods. Learners can progress in a self-taught manner and even repeat parts of the training program again. (Donnelly, 2006)

Other factors that can be mentioned as other benefits of blended learning include lower costs, improved education and increased interactions (NeshatAvar et al., 2009).

In order for a blended learning course to be effective, educational designers and educational and lesson planners should consider principles and rules when designing these courses:

Blending Design: A well-designed blend of teaching methods can provide appropriate learning experiences for most learners. In designing a blended learning course, learner characteristics should be properly considered, including the amount of time they need to access the training and other relevant factors.

Time flexibility: Flexibility in schedule is critical to success. The availability of the system enables people to study whenever they are ready and have the time.

Combining media and learning styles: Flexibility in media formats provides optimal learning experiences based on individual preferences. For the correct selection of methods and formats, the learning styles and the level of education of the audience, as well as the motivation of the learners, must be properly considered.

Learner support: feedback from instructors, subject matter experts, as well as technical and argumentative support from learners is needed, feedback can be sent to them within 24 hours, and this timely response can provide learners with the sense that behind the online environment, there is someone who can give them feedback and help.

Executive support: Blended learning, like any other important change in the business environment and educational environments, needs executive support.

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Content: The type and quality of learning content is essential for success. An important part of choosing appropriate content is deciding whether the learning activities have the potential to inform learners, develop skills, and build competencies.

The blended education system in terms of applying flexibility in the learning process and the ability to use the advantages of both face-to-face and electronic education methods can attract the satisfaction of teachers and students. Therefore, blended learning is because it develops and improves teaching and learning.

The method, strategy, technique or media in the matter of education is to provide content and educational materials. Applying the hybrid method in education provides educational experts with greater freedom and insight in using educational tools and environments. Blended learning allows professors to have a balanced presence in face-to-face and online classes, so that online components naturally enhance traditional classroom learning.

With the blended learning approach, the advantages of both educational approaches can be obtained, this approach can be effective in the teaching and learning process in many ways, some of these factors include quick feedback from the instructor to the student, increasing human interactions and flexibility in education. In addition, in terms of financial issues and costs, the blended learning approach has priority in all educational organizations, some practical activities are very complex and cannot be taught to learners face-to-face in the classroom, so blended learning is It provides the possibility to simulate such activities in a computer environment. (ElMansour & Mupinga, 2007).

The use of blended learning model enriches education and provides the possibility of providing an active learning experience, increasing accessibility and flexibility, familiarizing students of face-to-face systems with the category of self-education and learning through the web, and taking advantage of social and interpersonal interactions in the face-to-face part. It seems that blended learning with the advantages of both educational approaches (traditional and electronic) is an effective approach to increase the effectiveness of learning, create motivation and interest in students, since higher education, including medical education, is obliged to provide a large amount of Knowledge is attitude and skills, and students must achieve many educational goals in order to gain job qualifications (Al-Doub et al., 2009).

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The results of Karimi et al.'s research (2021) on the subject of the effect of blended education on learning the nursing process indicate the effective role of teaching with new educational methods compared to the traditional method, and the use of blended education increases enthusiasm, motivation and satisfaction towards lessons and communication. It is better to be a teacher with a student (Jamalzade et al., 2022)

Zulfiqari et al. (2009) aimed at the attitude of faculty members of the Faculty of Nursing and Midwifery of Tehran University of Medical Sciences regarding the strengths and opportunities of blended education, showed that 66% of the samples had a positive attitude, 34% had a positive attitude, and none of them had a negative attitude (Zulfiqari & Sarmadi, 2009).

Rovai's research has shown that blended learning classes give students the flexibility to do some of their learning activities at their own time and place individually, and provide the right educational opportunities for everyone at the right time and place. provides (Rovai, 2003). Also, the results of the surveys showed that blended training reduces the cost of training. The results show that most of the obtained savings are due to the change of personnel, student and instructor time(Owston & Wideman, 2008).

According to the results of Kose and Lopez Perez et al., despite the fact that lectures were used in more than 83% of traditional education classes, the focus and emphasis was on information transfer. Despite this, blended learning uses various methods in order to meet the different needs of students and leaves the instructor's hand free to exploit the benefits of each of these methods Lopez et al., 2011).

In research on the effectiveness of blended learning in the field of medical education (2018), Mir Moqtadai and Ahmadi came to the conclusion that the effectiveness of any type of training, including virtual training in the field of medicine, is one of the challenges facing all educational organizations in the field of medicine. Although the emergence of technologies has promised to provide us with these opportunities, this alone does not create effective education. Based on the findings of this research, it can be concluded that by fundamentally reviewing the admission of students and professors, as well as providing the necessary technical facilities in the field of blended education, we can find the right place for this education. On the other hand, it is possible to have an efficient orientation in the field of virtual education by holding empowerment courses for the professors of this field (Mirmoghtadaee & Ahmadi, 2019).

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In his research, Chase (2012) confirmed the effect of blended learning and its effect on students' academic motivation and satisfaction, and students' self-regulation problem solving skills, critical thinking, and creative thinking (Wang, 2015).

The results of Zarif Sanaini's research in comparing the knowledge and satisfaction of participating general practitioners before and after participating in the diabetes re-education course with two methods of electronic education and traditional education showed that there is a difference between the way the research samples access the computer and their attitude and satisfaction towards electronic learning. There is a significant relationship (Chodorow, 2015).

In the research conducted by Zarrabian in 2016 titled the effect of blended teaching-learning method on learning, motivation and interest in anatomy course in medical students, it was found that due to the importance of motivation and interest in medical students, it can be recommended to the professors that In addition to the traditional method, they should use blended methods to increase the motivation and interest of learners (Zarrabiyan, 2018).

Zulfiqari et al.(2009) in research about the effectiveness of the blended education system in the education of nursing and midwifery students of Tehran University of Medical Sciences, concluded that the majority of the teachers of the school had a positive attitude towards new educational technologies, including electronic blended education, and most of them were willing They participated in the training workshops of blended learning (Nasiri, 2012).

At the end of his research, Ruiz (2006) emphasizes that electronic education should not replace face-to-face classrooms, but should be used as a supplement and in combination with other usual methods (Ruiz et al., 2006).

Vaughan and Grayson (2006) believe that not only the combination of electronic methods with the face-to-face method increases students' learning, but their interaction and satisfaction also increases in the combination of these two methods (Vaughan & Garrison, 2006).

The results of Nasiri's study (2013) with the subject of comparing the effect of anatomy training by two blended methods and lectures on the learning and memorization of medical students of Bushehr University of Medical Sciences showed that the learning rate of the group of students trained by the blended method compared to the group of students trained by the method The speech has been more. (Nasiri, 2012)

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In the study of Kavadella et al. (2012) to evaluate blended learning for teaching oral radiology to dental students, the blended learning group students performed significantly better than the traditional group students in the post-course test (Kavadella et al., 2012).

In the study of Fraun et al. (2013) to investigate blended learning in the teaching of the preclinical unit of complete dentures, the efficiency of the students during the course was very favorable and they concluded that the blended learning program provided the necessary laboratory skills and training for adequacy in the preclinical environment. makes (Faraone et al., 2013).

Rohi et al.(2015) in a research comparing traditional education and hybrid education on the learning of practical oral pathology course of dental students concluded that hybrid education as a new mechanism that integrates various learning and teaching methods leads to more satisfaction for students and professors and can increase learning with the possibility of flexibility in learning and with the ability to take advantage of the advantages of both face-to-face and electronic education methods (Abbaszade et al., 2014).

A survey conducted in English higher education institutions showed that 94% of university professors believe that a combination of online and classroom-based teaching is more effective than classroom-based teaching, and 85% of them use learning technologies as a tool for improvement. They know the achievement of education (Klein, 2006).

In a review study conducted on blended education approaches in medical sciences by Khazaei et al. In addition to face-to-face classes, they are very effective in terms of student learning, and simulated programs have attracted the attention of many educational planners due to reducing costs and increasing the speed of learning (Khazaei & Rashedi, 2012).

In a review study by Sidi et al. (2012) in order to investigate the effectiveness of blended training for rehabilitation students, the results showed that this training method, if localized in Iran, can be useful in keeping therapists' information and clinical skills up-to-date (Seyedi & Yaghoubi, 2012).

Ceylan and Kesiki (2017) consider blended learning as a rich educational strategy based on an intensive course that combines online and offline, collaborative and individual, structured and unstructured learning environments and with educational pedagogical foundations based on the right learning styles at the right time. It guarantees learning (Ceylan & Kesici, 2017).

Driscoll, with a comprehensive view of the concept of blended learning, includes four combinations of web-based technology methods to achieve educational goals, combining a variety

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of pedagogical approaches to optimally produce learning outputs with or without technology, combining any type of educational technology with face-to-face and teacher-centered training. And he knows how to combine educational technology with real job tasks to create a harmonious effect between learning and academic achievement (Driscoll, 2002).

Behnek believes that blended learning is not just the combination of technology with education with the aim of increasing access to learning, but blended learning is basically related to rethinking and redesigning the teaching-learning relationship with an emphasis on a systemic approach and a contingent approach to time, place and the effect of learning (Behnke, 2012).

Based on the findings of Najafi (2018) in a research titled comparing the effect of blended and traditional methods of education on learning, blended education as a strategic approach of the 21st century has three dimensions: pedagogical basics, methodology and technology, which by effectively combining the methods of providing educational content with Various teaching patterns and learning styles of learners, optimal combination of learning tools, creation of new learning opportunities in the form of massive open online courses, increasing responsibility and social cooperation and increasing self-confidence and internal motivation of learners have increased the effectiveness and quality of learning courses (Najafi, 2019).

The study of Shirzadegan et al.(2019) regarding the comparison of three electronic, traditional and blended teaching methods on the learning of the health examination course in midwifery students, shows that the blended teaching method is more effective than other teaching methods such as traditional teaching and electronic teaching using the mobile phone was a companion in learning the lesson of examining the health status of midwifery students (Taheri et al., 2020).

Conclusion

This methodology is adept at establishing distinct multifaceted frameworks through the coordination of all components within the educational complex, coupled with the integration of novel educational theories, techniques, educational software, web platforms, etc., with the aim of fostering collaborative distance learning-educational complexes. The approach endeavors to amalgamate the principles of cognitive learning and social constructionism, amalgamating the components of the three educational systems - informing, empowering, and creating. Implementing this educational approach within the realm of electronic education yields benefits

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such as attaining a superior level of learning through the incorporation of information-communication technologies across varied learning environments to support both physical and virtual education, diminishing the expenses associated with accessing fundamental and costly information essential for specialized research, facilitating the organization and delivery of educational materials by educators in a flexible manner, centering the learner in the learning process by introducing a sequence of cognitive challenges, engaging learners in the administration of educational activities, elucidating course content, assessment criteria, and evaluation procedures, shortening the learning curve for all learners, enhancing learner engagement through the utilization of problem-solving and questioning techniques, fostering group interactions and healthy competition within a dynamic framework, and more.

Recognizing the imperative nature of the aforementioned topic and the necessity of incorporating this educational approach within the electronic education system, this study aims to explore the concepts, underpinnings, methodologies, as well as the benefits of blended education into electronic education. Leveraging blended learning can facilitate its advancement and proliferation amidst the era of emerging crises like the covid-19 pandemic and the demand for innovative teaching-learning paradigms.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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