Review Article

Application of cognitive apprenticeship model in clinical education: A scoping review

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Abstract

Background & Objective: One of the main aspects of medical education is clinical education. Cognitive apprenticeship model as a principle of clinical education provides an opportunity for medical students to transform theoretical knowledge into a variety of cognitive, attitudinal, and psychomotor skills that are essential for patient care. The purpose of this study is to introduce the cognitive apprenticeship model, its dimensions, and its position in clinical education.

Materials & Methods: In this scoping review study, the keywords including Cognitive Apprenticeship Model, Clinical Teaching, and Medical Education were searched in Scopus, Web of Science, EMBASE, and Medline databases between 2009 and 2021. After removing duplicates and considering the direct relationship of the articles to the study's aim, full texts were reviewed.

Results: A total of 170 records were found, out of which 15 articles were finally examined from three aspects including, introduction of cognitive apprenticeship model, position of cognitive apprenticeship model in clinical education, and evaluation of cognitive apprenticeship model. A cognitive apprenticeship model is a powerful tool for applying theoretical knowledge to clinical experiences and practicing skills through observation, participation, clinical reasoning, and independent clinical practice.

Conclusion: Developing the educational competencies of clinical faculty members and providing suitable opportunities for them to apply the dimensions of the cognitive apprenticeship model in clinical education has positive effects on the effort, perseverance, and future performance of students.

Introduction

As an important part of higher education system, medical education deals with society's health. Clinical education is known as the heart of medical education by providing an opportunity for medical students to acquire clinical skills. Medical students spend more than half of their training time in clinical departments and acquire attitudinal and psychomotor skills in history taking, physical examination, clinical decision-making, and clinical reasoning (1). Clinical education includes any type of education provided in the patient's presence, regardless of the educational environment (2).

Clinical education leads to increased patients' understanding of their diseases and related diagnostic and treatment measures, improved clinical decision-making, close contact with the reality of the medical profession, application of theoretical knowledge in the real environment, and students' personal development (3). Nevertheless, numerous studies have demonstrated that clinical education does not create competencies appropriate to the needs of clinical environments in many cases (4, 5). Moreover, the main activity of clinical departments in hospitals revolves around the provision of medical services to patients, and a smaller portion of these activities deals with clinical education, which potentially has a negative effect on the clinical education of medical students (6).

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Based on the studies, in a complex clinical environment, the presence of competent faculty as a key factor in successful clinical education has a significant impact (7). These faculty use appropriate educational methods to provide an effective learning environment to empower students (8). Considering the amount of energy and time that clinical faculty spend on training medical students in clinical departments, a valid evaluation is necessary to show the strengths and weaknesses and the ways to improve this training (9). The results of this evaluation would be useful when they are based on an underlying theory since it provides a basis for comparing findings and guiding evaluation results in order to improve performance (10).

Among the basic principles in clinical education, we can refer to Cognitive Apprenticeship Model. This model was first developed by Collins et al. in 1989 by revising the traditional apprenticeship model. The cognitive apprenticeship model is suitable for training tasks in complex situations. The six dimensions of this model refer to cognitive and metacognitive learning through guided experience instead of focusing on physical processes (11). This model has been used in different fields of education, and its application is increasing in various areas of medical sciences, such as nursing, medicine, pharmacy, and veterinary (12, 13). Lyons et al. (2017) in a review study investigated the use of the cognitive apprenticeship model in health science education research. They recommended that future studies use this model for educational design and improvement of learning outcomes in various fields of clinical education (14). Butler et al. (2019) described the studies conducted using the cognitive apprenticeship model in clinical education. The researchers stated that this model greatly impacts learning clinical skills, especially in long-term use. They recommended that clinical faculty need to be familiar with the concepts of this model so that they can use it to design their educational programs and implement them (7). Matsuo et al. (2020) reviewed studies using the cognitive apprenticeship model to find strategies for improving educational management and learning in the workplace. They indicated that despite the existence of studies on the application of the cognitive apprenticeship model to improve such skills as educational leadership, decision-making ability in doctors, and interprofessional cooperation in clinical environments, there is a dearth of studies on the use of the mentioned model for learning in work environments. They suggested that future studies be conducted on the application of the cognitive apprenticeship model for the learning of post-graduate students in work environments and residents in clinical environments (11).

Minshew et al. (2021) in a review study, examined the cognitive apprenticeship model for teaching graduate students. The results of this study pointed to the effect of the mentioned model in providing great opportunities to transfer faculty's knowledge to students to encourage and support them. They recommended that faculty of other disciplines who need to improve students' skills and do not just increase their knowledge should also use the cognitive apprenticeship model (15).

Considering the existing challenges in the clinical education of medical students and the need to improve it, more attention should be paid to the use of clinical education methods in order to acquire the necessary skills for patient care. Despite the emphasis of the literature on the application of the cognitive apprenticeship model and its dimensions in clinical education, as well as the widespread use of this model in medical schools around the world, there is a paucity of studies on the familiarity of clinical faculty with this model and its application in clinical education environments.

In light of these issues, the present study aimed to introduce the cognitive apprenticeship model, its dimensions and its position in clinical education. The results of this research can be used by clinical education planners and faculty in this field. They can lead to the improved achievement of clinical goals of acquiring the necessary qualifications of the medical profession.

Materials & Methods

This research was a scoping review that provides a preliminary assessment of the size and potential scoping of the existing literature. This type of study aims to identify the nature and extent of research evidence (16).

Search strategy

This research was performed in 2021. The search strategy was implemented based on the characteristics of each database using the keywords of Cognitive Apprenticeship Model, Clinical Teaching, and Medical Education. Four databases of Medline, Embase, Web of Science, and Scopus were searched without any time limit, and the results were retrieved. The search strategy for each database is presented in Table 1.

Table 1. Search strategy for each database

Database		Search strategy
PubMed	#1	"cognitive apprenticeship"[Title/Abstract]
	#2	"education, medical/methods"[MeSH Terms]
	#3	"medical education"[Title/Abstract]
	#4	"clinical teaching"[Title/Abstract]
	#5	"clinical education"[Title/Abstract]
	#6	#2 OR #3 OR #4 OR #5
	#7	#1 AND #6
Embase	#1	'cognitive apprenticeship':ab,ti,kw
	#2	'medical education'/exp
	#3	'medical education':ab,ti,kw
	#4	'clinical education':ab,ti,kw
	#5	'clinical teaching':ab,ti,kw
	#6	#2 OR #3 OR #4 OR #5
	#7	#1 AND #6
Scopus	(TITLE-ABS-KEY ("cognitive apprenticeship") AND TITLE-ABS-KEY ("medical education" OR "clinical teaching" OR "clinical education"))	
Web of Science	(((TS=("medical education")) OR TS=("clinical teaching")) OR TS=("clinical education")) AND TS=("cognitive apprenticeship")	

Inclusion and exclusion criteria

The inclusion criteria entailed 1) the presence of keywords in the title and abstract of the study and 2) articles in Persian and English languages. On the other hand, the exclusion criteria were the unrelatedness of the content of the studies to the purpose of the research, unpublished sources, and information presented in conferences and theses. Duplicate studies were excluded from the review, and considering the direct relationship between the articles and the purpose of the research, only the articles that were available in full text were reviewed.

Checking the quality of studies

The quality of the studies was checked using the BEME checklist, which consists of 11 criteria. Each is rated as "met," "unmet," or "unclear." To be deemed of high quality, studies are required to meet a minimum of seven indicators. The quality of the full text of related studies was initially assessed by one researcher and re-evaluated by a second researcher. Disagreements were resolved by discussion. No research was excluded based on the quality assessment results.

Results

Based on the results of the search, 170 articles were retrieved, out of which 134 studies were duplicates or irrelevant in terms of research purpose and were excluded from the review process. In reviewing the abstract of the remaining studies, 14 papers were excluded, and 19 articles that were directly related to the purpose of the research were examined. Finally, 15 studies that had the most relevance and correlation with the purpose of the research were carefully examined. Based on the investigations, this model has been more popular since 2009, and therefore the documents before 2009 were discarded. Figure 1 displays the steps of study selection. The selected studies were in English and Persian languages.

Table 2 illustrates the details of the reviewed studies. To analyze the content of related studies, the researchers examined them from three aspects, including the introduction of the cognitive apprenticeship model, the position of the cognitive apprenticeship model in clinical education, and evaluation in the cognitive apprenticeship model.

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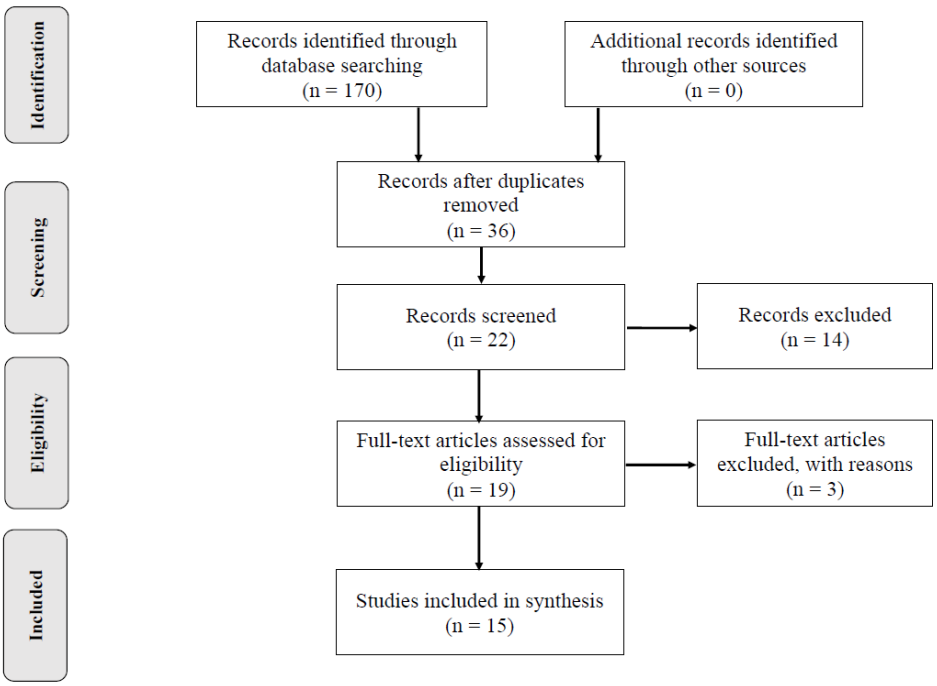

Figure 1. Steps of study selection

Table 2. Characteristics of reviewed studies

Row	First author	Year of publication	Research method	Data collection method	Study purpose	Application of the article in the review	BEME Score
1	Matsuo M	2020	Review	-	Description of the cognitive apprenticeship model	Introducing the cognitive apprenticeship model	8
2	Konishi E	2020	Quantitative	Questionnaire	Investigating the impact of the empowerment course using the cognitive apprenticeship model	Position of the cognitive apprenticeship model in clinical education	7
3	Stalmeijer RE	2020	Quantitative	Questionnaire	Psychometrics assessment of Maastricht Clinical Teaching Questionnaire	Evaluation in the cognitive apprenticeship model	7
4	Butler BA	2019	Review	-	Description of cognitive apprenticeship model and its application in orthopedic education	Introducing the cognitive apprenticeship model, Position of the cognitive apprenticeship model in clinical education	7
5	Tsukube T	2020	Quantitative	Questionnaire	Investigating the effect of the cognitive apprenticeship model on physicines' professional development	Position of the cognitive apprenticeship model in clinical education	9
6	Stalmeijer RE	2013	Qualitative	Questionnaire	Investigating the effect of the cognitive apprenticeship model	Introducing the cognitive apprenticeship model, Position of the	10

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						cognitive apprenticeship model in clinical education	
7	Amini M	2012	Quantitative	Questionnaire	Evaluation of clinical professors using cognitive apprenticeship model	Introducing the cognitive apprenticeship model, Position of the cognitive apprenticeship model in clinical education	9
8	Stalmeijer	2009	Qualitative	Focus group	Investigating students' experiences of education with the cognitive apprenticeship model	Evaluation in the cognitive apprenticeship model	7
9	Tariq M	2021	Quantitative	Questionnaire	Identifying learning strategies using the cognitive apprenticeship model	Introducing the cognitive apprenticeship model, Position of the cognitive apprenticeship model in clinical education	11
10	Mirzaei K	2014	Quantitative	Questionnaire	Evaluation of clinical professors using the cognitive apprenticeship model	Introducing the cognitive apprenticeship model, Position of the cognitive apprenticeship model in clinical education	8
11	Boerboom TB	2011	Quantitative	Questionnaire	Translation and psychometric assessment of the Maastricht Clinical Teaching Questionnaire	Evaluation in the cognitive apprenticeship model	8
12	Boerboom TB	2012	Quantitative	Questionnaire	Evaluation of clinical professors using the cognitive apprenticeship model	Introducing the cognitive apprenticeship model, Position of the cognitive apprenticeship model in clinical education	9
13	Giannasi SE	2019	Quantitative	Questionnaire	Translation and psychometric assessment of the Maastricht Clinical Teaching Questionnaire	Evaluation in the cognitive apprenticeship model	7
14	Al Ansari A	2019	Quantitative	Questionnaire	Translation and psychometric assessment of the Maastricht Clinical Teaching Questionnaire	Evaluation in the cognitive apprenticeship model	11
15	Rodino AM	2019	Quantitative	Questionnaire	Evaluation of clinical professors using the cognitive apprenticeship model	Introducing the cognitive apprenticeship model, Position of the cognitive apprenticeship model in clinical education	10

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Introduction of the cognitive apprenticeship model

The effective supervision of clinical faculty on the performance of medical students in clinical education is the key to successful education in clinical environments (17). Clinical education is usually taught based on the Traditional Apprenticeship Model. In this model, students observe their faculty's performance as a role model. Although the role of the faculty as a model has been emphasized in many studies (18), apart from this role, the direct involvement of the student in the process of diagnosis and treatment of the patient makes clinical education more effective (17).

According to these concepts, a new model for clinical education was proposed under the title of the cognitive apprenticeship model. In this model, learning is achieved based on student's involvement and performing activities in the clinical environment (19). The cognitive apprenticeship model is an example of Zone of Proximal Development in Vygotsky's theory, in which learners need the help of more skilled people to complete difficult tasks. The cognitive apprenticeship model should be presented to learners in such a way that they can use their proximal development zone and learn a new skill in this way (20). The cognitive apprenticeship model helps students to develop in an interactive educational environment and use their skills to guide other students (20). The cognitive apprenticeship model consists of six dimensions, including modeling, coaching, scaffolding, articulation, reflection, and exploration (11) which are explained below.

Modeling: Students observe their faculty during clinical activity, and faculty also teach students how to reason clinically. In fact, modeling properly occurs when faculty interact with students and share their views with them (18). In modeling, students observe their faculty and subsequently places them as a role model.

Coaching: It refers to faculty observing students and providing specific feedback on their performance. In coaching, faculty should monitor students' performance and allow them to develop a sense of discovery and problem-solving. The students should be prevented from straying too far from the subject and provided with special feedback (18).

Scaffolding: Scaffolding emphasizes that support from faculty for student's learning must be tailored to students' individual knowledge levels. As students become more competent, then support can be gradually reduced. This requires the faculty to pay close attention to the individual abilities of the learners and recognize the right time to help them (12).

Articulation: It involves faculty questioning students and stimulating them to ask questions. This process encourages students to reflect on clinical activities (14).

Reflection: The clinical faculty encourages students to reflect on their clinical skills and compare their abilities with experts or other students (18).

Exploration: The faculty presents the general goals of the lesson to the students and encourages them to pay more attention to more detailed goals that are also of interest to them. In this part, the students can identify their goals and pursue them (14, 18).

Position of the cognitive apprenticeship model in clinical education

The quality of educational performance of clinical faculty affects medical students' bedside learning (19). The methods of monitoring students have been explicitly stated in the cognitive apprenticeship model (18). Numerous studies have investigated the results of using this model all across the universe. A study by Stalmeijer et al. (2009) assessed medical students' experiences of the learning atmosphere and the suitability of the cognitive apprenticeship model for students' learning experiences in clinical rounds. The results denoted that students had experienced all six dimensions of the cognitive apprenticeship model in their apprenticeships. Nonetheless, three dimensions, including modeling, and scaffolding, were reported more frequently.

Moreover, it was revealed that the faculty's time limitation and their lack of development were among the obstacles of effective clinical education. Furthermore, the results indicated that the cognitive apprenticeship model is useful for clinical education and is a valuable basis for evaluating and empowering clinical faculty (21). In another study by Stalmeijer et al. (2013), it was stated that this model is a valuable guide for clinical educational activities and provides suggestions for effective apprenticeship design (22).

Tariq et al. (2021) identified learning strategies using the cognitive apprenticeship model and pointed out that scaffolding and coaching were very effective for learning in clinical rounds. They also reported that a positive learning environment helps to improve learning (23). In Iran, only two studies have investigated the application of the cognitive apprenticeship model in clinical education of medical students. Amini et al. (2009) conducted a study to evaluate faculty in the

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educational departments of Shahid Faghihi Hospital in Shiraz based on the cognitive apprenticeship model. They concluded that from the students' point of view, the most important characteristics of the faculty who got the highest evaluation score were exploration, scaffolding, and coaching. Moreover, the students stated that the majority of the assessed sections need to be strengthened in terms of motivating students (18).

Mirzaei et al. (2013) conducted a study to report medical students' assessment of clinical faculty at Bushehr University of Medical Sciences based on the cognitive apprenticeship model. They indicated that based on students' opinions, the roles of clinical faculty in order of priority are modeling, scaffolding, coaching, reflection, and exploration. It was also stated that learning clinical skills requires gaining experience and practicing on skills by observing, participating, and independently performing activities under the supervision of the faculty. Emphasizing on the active roles of faculty for more effective education should always be considered in the evaluation of faculty's performance and providing them with effective feedback (24).

Evaluation in the cognitive apprenticeship model

Several evaluation instruments have been designed and used to assess clinical education from students' perspectives. One of the most common instruments was developed at Stanford University School of Medicine. Although this instrument was confirmed in terms of construct validity with seven factors and reliability with Cronbach's alpha coefficient of 0.97, instead of focusing on the supervision of clinical faculty, it emphasizes on the evaluation of small group method; therefore, it is not suitable for evaluating the teaching provided by the clinical faculty (25).

Another instrument is the Cleveland Clinic's Clinical Teaching Effectiveness Instrument (CCCTEI), which its validity and reliability have been confirmed; however, the underlying theory of the instrument is not clear (26).

The other instrument is the Maastricht Clinical Teaching Questionnaire (MCTQ) based on the cognitive apprenticeship model. This questionnaire was developed by Stalmeijer et al. (2010) to evaluate the teaching skills of clinical faculty in clinical rounds, and includes 24 items that examine the six dimensions of the cognitive apprenticeship model, as well as the learning atmosphere of the clinical environment (27).

Multiple studies have been conducted to investigate the psychometric properties of this instrument and the educational effects of its application in different countries and languages. Stalmijer et al. (2010) reported that this questionnaire, with Cronbach's alpha coefficient of 0.96 and good construct validity assessed by confirmatory factor analysis, is a valid instrument for evaluating clinical education. In this study, a clinical education model was designed that highlights modeling, coaching, and exploration as a necessity for effective clinical education (27). Boerboom et al. (2011) conducted a study to assess the psychometrics of the Maastricht Clinical Education Questionnaire by examining construct validity, content validity, and reliability from two aspects of internal consistency and instrument stability. The construct validity was confirmed using confirmatory factor analysis with five factors, and reliability was verified, rendering a Cronbach's alpha coefficient above 0.70. Content validity was confirmed based on the cognitive apprenticeship model (28). Boerboom et al. (2012) examined the possible effects of differences between students who evaluate clinical faculty, as well as the personality traits of students and faculty, using multilevel analysis and the Maastricht Clinical Teaching Questionnaire. They concluded that a significant part of variations in students' scores were due to differences between faculty, especially in learning atmosphere, modeling, and coaching. The personality traits of faculty and students had a minor or insignificant effect. The findings of this research pointed to the validity of the Maastricht Clinical Teaching Questionnaire for evaluating faculty' performance (29). Giannasi et al. (2019) carried out a study to assess the content validity, construct validity, and reliability of MCTQ based on the answers of the residents of two educational hospitals regarding 187 clinical faculty. The results demonstrated that the Spanish version of the questionnaire with five factors and Cronbach's alpha coefficient of 0.80 is a valid instrument for evaluating clinical education (30). Konishi et al. (2020) assessed clinical faculty's self-evaluation of educational perceptions and behaviors after a faculty development program using MCTQ. The results suggested that MCTQ can be useful for self-evaluation of clinical faculty and for assessing the effectiveness of faculty development programs (31). Al Ansari and colleague (2019) evaluated the psychometric characteristics of the Maastricht Clinical Teaching Questionnaire using exploratory and confirmatory factor analysis and calculating Cronbach's alpha coefficient. The results showed that the Maastricht

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Clinical Teaching Questionnaire with four factors and Cronbach's alpha coefficient of 0.97 is a valid instrument for evaluating faculty's performance in clinical education in Bahrain (32). Rodino and colleague (2019) used the Maastricht Clinical Teaching Questionnaire to evaluate faculty's use of the cognitive apprenticeship model in the field of pharmacy using exploratory and confirmatory factor analysis. The results illustrated that the Maastricht Clinical Teaching Questionnaire has a suitable validity for evaluating faculty. In this research, it was suggested that future studies should be conducted to investigate the relationship between the components of the cognitive apprenticeship model and the educational activities of faculty in order to improve clinical education (33).

Despite the widespread use of this instrument in different countries, so far, only one study has applied it in Iran. In this research, the examined questionnaire contained 28 items, and only reliability was studied in terms of internal consistency. Also, content validity without mentioning the method was investigated (18).

Discussion

The present research reviewed the cognitive apprenticeship model and its dimensions, as well as the position of this model in clinical education in the world and Iran. The findings pointed out that at the international level, several studies have used this model in clinical education (12, 13). Nevertheless, so far, no study in Iran has used this model to improve clinical education in medical students. The development of an efficient workforce in the health system in order to respond to the needs of society is possible with providing an opportunity to practice skills to achieve clinical qualifications. Therefore, systematic evaluation improves clinical education (34).

Clinical education as an active learning process, which is the most appropriate way to teach medical students as adult learners, provides an opportunity for them to convert theoretical knowledge into a variety of attitude and psychological skills which are necessary for patient care (35). To learn clinical skills, students prefer methods that focus on reflection in clinical practice and self-directed learning (33). Jalalpour and colleague (2014) assessed medical students' evaluation of clinical faculty at Bushehr University of Medical Sciences based on the cognitive apprenticeship model. They concluded that based on students' opinions, the roles of clinical faculty were modeling, scaffolding, coaching, reflection, and exploration in the order of priority (24).

Burgess et al. (2020) examined key approaches and points for education in clinical environments. The results of this research stated that since students mainly learn clinical skills through observing and modeling their faculty, the faculty as a role model plays an important role in influencing clinical education. Feedback also plays an important role in the process of clinical education. The observation of the performance and provision of detailed feedback to students reduces the gap between actual and desired performance (36). The results of this study are in line with the dimensions of the cognitive apprenticeship model. In 2017, Pelaccia and colleague (2017) stated that the self-regulation of motivation in students was improved by clinical faculty' use of active teaching methods derived from learning theories, such as the cognitive apprenticeship model (37). Cognitive apprenticeship model has been developed as a flexible and comprehensible model in rapidly changing educational clinical environments and has been validated as a useful approach for designing, implementing, and evaluating clinical education.

Furthermore, the cognitive apprenticeship model is effective in developing the knowledge, skills, and attitudes of medical students in order to acquire professional competencies to provide comprehensive treatment to patients. Moreover, it is a framework for evaluating the quality of clinical education provided by clinical faculty and providing feedback to them (14). This model is rooted in situational learning theory (38), according to which, social interaction is the main factor in building knowledge. Based on this theory, knowledge exists in a social context and is shared among people; therefore, communication between students and student- faculty communication are key factors in acquiring knowledge and skills (39). This theory states that learning is achieved most effectively through cooperative activities (40). In other words, knowledge is built based on the two-way interaction between the environment and the person in the surrounding social environment, and faculty are recommended to provide opportunities for students to practice, talk, and reflect (41). Feinstein et al. (2021) presented the results of the application of the cognitive apprenticeship model with an emphasis on situational learning in the field of psychotherapy. The result demonstrated successful experiences and positive opinions of students, faculty, and even patients from psychotherapy sessions. In this study, the patients expressed their interest and appreciation for participating in the therapy sessions that were held

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based on the cognitive apprenticeship model. Many students asserted that the faculty-student interaction during psychotherapy was a unique learning experience that helped them gain a more realistic view of what happens in psychotherapy. Moreover, from the faculty's perspectives, it was a rich learning experience, and they enjoyed interacting with students and the direct feedback they could give and receive (38).

In addition, the cognitive apprenticeship model puts an emphasis on the use of special educational strategies for adult learning. Based on the principles of adult learning, the teaching-learning process should provide an opportunity for students to participate actively in education (42). This is possible through problem-solving, prioritizing collaborative activities, learning based on personal learning style, promoting internal motivation, and providing opportunities for experience (43). The need to observe the principles of adult learning is more evident in clinical education due to the specific complexities of the clinical environment. The cognitive apprenticeship model helps clinical education to be based on adult learning by emphasizing the role of clinical faculty as a role model for students, involving them in problem-solving process, faculty's careful attention to the individual abilities of the learners, using question and answer, as well as activating student's reflection on clinical activities (14). Woolley and colleague (2007) pointed out that the use of the cognitive apprenticeship model with an emphasis on adult learning principles provides nursing students with a golden opportunity to learn clinical skills under the supervision of clinical faculty (44). Austin (2009) investigated the impact of the cognitive apprenticeship model on preparing PhD students for their future responsibilities as faculty members demonstrated that the teaching strategies proposed by the cognitive apprenticeship model could be a basis for constructive interdisciplinary dialogue (45).

Apart from the dimensions of the apprenticeship model, the learning environment is also one of the most important components in student learning, and the student's understanding of the educational environment is positively correlated with his/her learning (46). This feature is one of the areas studied in the Maastricht Clinical Teaching Questionnaire. Abbasi et al. (2012) assessed the factors affecting clinical education and concluded that the clinical environment has a positive impact on student learning (47).

Given the importance of examining the status of clinical education in the development of clinical faculty and enhancement of organizational capacity, an appropriate evaluation can help clinical faculty select effective teaching methods in the hospital environment, creating a better educational environment. Therefore, it is necessary to empower faculty to promote more clinical education (48).

Among the notable limitations of this study, we can refer to the fact that since the present study is a review, the selection of studies may be associated with author bias. However, the researcher tried to reduce the potential bias as much as possible by studying multiple sources. Moreover, the use of inclusion and exclusion criteria helped to reduce bias. According to the results of the present study, to take advantage of the cognitive apprenticeship model, which leads to students' improved clinical abilities in complex clinical situations, it is recommended that clinical education planners in medical universities provide a suitable ground for clinical faculty to use the cognitive apprenticeship model in clinical education and provide educational facilities for their educational development in educational policies.

Conclusion

Learning clinical skills requires students' use of theoretical training in clinical situations and practicing skills by observing, participating, clinical reasoning, and independent clinical activities. In this process, the most important role is played by a clinical faculty with supervision and guidance. The emphasis on faculty's active role in more effective education is always taken into account in evaluating the performance of faculty, providing feedback, and developing them.

Ethical considerations

This study was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1399.636). This study was conducted with the financial support of the Vice-Chancellor for Research and Technology of Kerman University of Medical Sciences (project number: 99000898).

Conflicts of interest

The uthors declare that they have no conflict of interest.

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