Original Article Open Access

Elaborating on the Pedagogical Knowledge Achievement in a Clinical training: A Grounded Study

khaironnesa Ramazanzade[1], Mohsen Ayati[1*], Farshid Abedi[2], Hossein shokohifard[1]

[1] Department of Education, Faculty of Education and Psychology, University of Birjand, Birjand, Iran.
[2] Infectious Diseases Research Center, Birjand University of Medical Sciences, Birjand, Iran.

Article Info

Article history:
Received 06 May 2020
Accepted 30 Nov 2020
Published 01 Jan 2021
Keywords:
knowledge achievement, pedagogical knowledge, clinical instructor

***Corresponding author:**
Mohsen Ayati, Department of Education, Faculty of Education and Psychology, University of Birjand, Birjand, Iran.
Email: Mayati@birjand.ac.ir

Abstract

Background & Objective: Aside from professional and subjective knowledge effective education requires pedagogical knowledge, which educators need to acquire. The present study aims to explain the ways to achieve pedagogical knowledge by clinical educators in the field of medicine.

Materials and Methods: In the present qualitative study–grounded theory– 27 clinical instructors of Birjand University of Medical Sciences, with enough experience or knowledge were interviewed (semi-structured interview). Based on Corbin and Strauss's analytical approach (2008), along with data collection to reach theoretical saturation and grounded theory, constant data comparison was done. Finally, in order to ensure authenticity and consistency of the study Lincoln and Guba's criteria were used.

Results: The final findings of the research include category: contexts for acquiring and identifying pedagogical knowledge, knowledge acquisition strategies as a study phenomenon and limiting the acquisition and identification of pedagogical knowledge, and consequently the lack and dispersion of pedagogical knowledge as the most important concern. Acquisition and identification skills of pedagogical knowledge as a causal condition and finally improving the quality and development of education, improving student satisfaction and learning as a result.

Conclusion: Acquiring teacher knowledge requires the benefit of individual learning strategies and professional development in the organizational, cultural and individual context. However, examining the results of using these strategies in promoting teachers' teacher knowledge is a starting point for future research.

Introduction

The preparedness of highly competent instructors has been a matter of debate in recent decades (1-3). The research conducted in this area mostly focuses on the talent, knowledge, and performance of these individuals (4, 5). Regarding the pedagogical knowledge of professors, a literature review revealed that a professor creates knowledge in the classroom and in interaction with students that is distinct from their formal knowledge. Schon (1992) defines this knowledge as experimental or practical knowledge, and in expressing the characteristics of teachers' professional performance, Carter (1990) regards pedagogical knowledge as a situational, sensory, special, and highly experimental knowledge that depends on the formal, basic and practical knowledge and its formation requires several years of experience and engaging in teaching (6).

Shulman (1987) suggests that there are seven categories of knowledge bases: content knowledge (CK); general pedagogical knowledge (GPK); curriculum knowledge; pedagogical content knowledge (PCK); knowledge of learners and their characteristics; knowledge of educational contexts and knowledge of educational purposes and values (7, 8). Obviously, mastering a variety of teacher knowledge ensures the effectiveness of education (9). In the field of medicine, clinical teachers rarely achieve the primary principles of pedagogical knowledge. Nonetheless, most of them become competent teachers. It is generally believed that the tacit knowledge of the mentioned principles is

learned through the experience of teaching (10). While the majority of new clinical instructors enter the field of teaching with abundant clinical experience, there is a concern that they may not be sufficiently prepared for educational activities (11). In addition, they may need educational approaches beyond traditional methods in fields such as nursing, where the official pedagogical knowledge is obtained during the course of education, and also due to extensive changes in education and its conditions (12). Therefore, they require the acquisition of pedagogical knowledge. These knowledge areas help clinical teachers provide education that suits the clinical level and conditions of students (13). However, studies show that most clinical instructors face problems in clinical education (14, 15), they seem to lack this knowledge due to various reasons, including a lack of familiarity of some clinical professors with methods of acquiring pedagogical knowledge.

A literature review revealed a scarcity of research on pedagogical knowledge acquisition methods in clinical teaching (16), and researchers such as Steinert et al. (2006), Notzer and Abramovitz (2008), Stratos et al. (1997), and Ribeiro et al. (2020), who have carried out studies on the pedagogical knowledge of medical sciences faculty, have only focused on the effectiveness of educational courses in the improvement of instructors' performance or emphasized the importance of pedagogical knowledge (17-20). Nevertheless, identifying the strategies to acquire pedagogical knowledge is necessary for developing educational plans to train competent teachers with a suitable level of pedagogical knowledge.

The results of research on pedagogical knowledge of professors can significantly contribute to educational policymaking and curriculum planning (2). In addition, the identification of strategies to acquire pedagogical knowledge can facilitate the process of instructors' knowledge development. Given the fact that the acquisition and identification of knowledge are affected by features, conditions and facilities, the identification of these strategies in universities of medical sciences requires qualitative research in order to recognize the strategies accurately and based on the contextual foundation. With this background in mind, the present study aimed to determine strategies to acquire and achieve pedagogical knowledge by clinical instructors.

Materials and Methods

The present article is a part of grounded theory research. In total, 27 clinical instructors at Birjand University of Medical Sciences were selected based on the inclusion criteria of at least one year of clinical work and the willingness to participate in the study and present rich experiences. First, the subjects were selected by purposive sampling, followed by theoretical sampling with maximum diversity (clinical fields). Attempts were made to select instructors from all areas of nursing, medicine, medical emergencies, and dentistry, all of which have a treatment field. Data were collected using semi-structured interviews with memo writing, and the process continued until theoretical saturation. The notes helped the researcher select the next individuals for the interview (who and from where). In addition, the notes might have helped the researcher ask other questions and use the notes as implicit codes to guide data in the analysis process. Interviews took 30-107 minutes and were conducted at the appropriate venue that was convenient for the participants. Data collection was performed simultaneously with their continuous analysis after the first interview, and this type of data collection and analysis led to the formation of concepts used in the design of questions to gather more information. The process continued until reaching theoretical saturation, meaning a point where the concepts were fully defined and explained and the relationships between the concepts became clear. In addition, the concepts obtained from new interviews were duplicates and no new concept was formed.

Nevertheless, three other individuals were interviewed to ensure saturation.

Ethical considerations included coordination and gaining permission to enter the research setting, explaining the research objectives and the interview technique to the participants, and ensuring them of the confidentiality terms regarding their personal information. In addition, participation in the research was voluntary and the subjects were allowed to withdraw from the research at any point. Moreover, informed consent was obtained for interviews and recording the conversations. It is notable that the ethics code of the article was obtained from the National Committee for Ethics in Biomedical Research (Ethics Committee of Birjand University of Medical Sciences, IR.BIRJAND.REC.1398.002).

Corbin and Strauss's analytical approach (2008) was applied for data analysis (21). Accordingly, data analysis was performed simultaneously with data collection, with the help of continuous comparison and analytical tools such as questioning and comparing concepts within a class and concepts of a class with other classes (Figure 1). Data analysis was performed in MAXQDA software version 2018. The Lincoln and Guba criteria were applied to confirm the results and accuracy of the data (22). The review was conducted by the research team and participants to confirm credibility. In addition, theoretical sampling was performed with maximum variability to achieve transferability, and dependability was obtained by matching the recorded interviews with the notes and by using objective questions. Furthermore, confirmability was approved based on peers' feedback, and all stages were recorded with details.

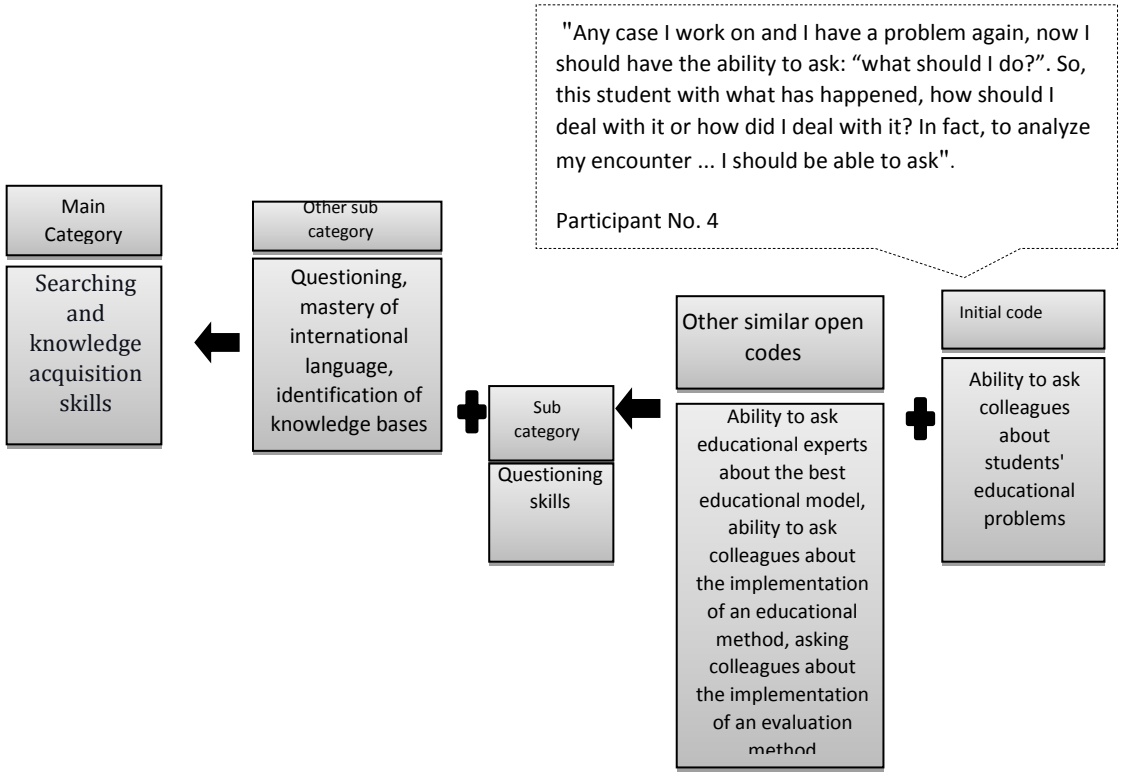

Figure 1: The process of forming a Category of data

Results

In total, 27 individuals (17 women and 10 men) were enrolled in the research. In terms of age, the participants were in the age range of 30-50 years, and they had 2-25 years of experience. In addition, all participants were active in the field of clinical training and interested in the area of education (Table 1).

Table 1: Demographic characteristics of the studied sample

Average teaching experience	Gender		N	participant
	Man	Female		
7 years	7	12	19	Clinical physicians
6 years	3	2	5	\Nursing / Operating Room / Medical Emergency instructors
3.5 years	0	3	3	Dental Instructors

The final findings of the research included categories of "contexts for acquiring and identifying pedagogical knowledge" as the context, "knowledge acquisition strategies" as the central code, "restrictions on the acquisition and identification of teacher knowledge", and as a result "the lack and dispersion of pedagogical knowledge" as the most important concern, "acquisition and identification skills of pedagogical knowledge" as a causal condition, and ultimately "improving the quality and development of education" and "improving student satisfaction and learning" as a consequence, all of which are presented in Figure2.

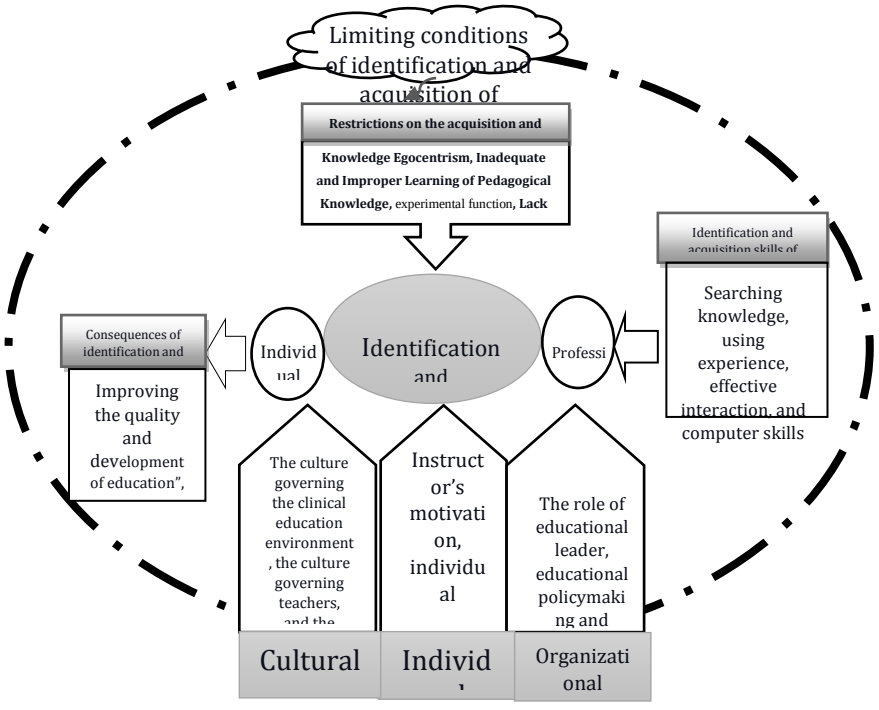

Figure 2: paradigm pattern of identification and acquisition strategies

Contexts for Acquiring and Identifying Pedagogical Knowledge

According to the participants, the acquisition and identification of knowledge occur in various contexts, including individual, organizational and cultural contexts. In expressing their experiences, these individuals referred to individual contexts including the instructor's motivation, individual features, and individual attitudes and beliefs of teachers. Regarding motivation, one of the instructors stated:

"If I am motivated, I will read books and attend concentrated courses and workshops."

In terms of organizational context, some of the teachers referred to the role of educational leader, educational policymaking and legislation, monitoring and assessment, faculty selection, and payment policies. In this regard, one of the teachers expressed:

"If the system obligates it so that I would need it,…for instance, if you say: you must present your educational content electronically and students must be trained in this way, I will certainly be obligated to learn all aspects of E-learning…" (Participant 12)

According to the participants, the cultural contexts affecting the identification and acquisition of pedagogical knowledge included the culture governing the clinical education environment, the culture governing teachers, and the culture governing the high-ranking managers of the organization. One of the teachers asserted:

"If education is the last important thing in the academic environment, meaning that I am instructed to teach something to anyone possible as if the content of the course is the only thing that has no value, then anyone could do it. Why would I spend so much time listening to a CD so that I could improve my work?" (Participant 2)

Pedagogical Knowledge Acquisition Strategies as a Phenomenon

Strategies to identify and acquire pedagogical knowledge are methods and approaches used by clinical teachers to receive their required pedagogical knowledge. There are two types of strategies, including individual learning and professional education.

A) Individual Learning Strategy:

Individual learning is defined as techniques used by the individual to acquire the necessary knowledge without a need for professional development planning by the organization so that they could provide more effective education. To acquire knowledge, teachers require various measures, including personal study, virtual learning, practicing teaching, using experiences, nonofficial education, the guidance of professors, as well as attaining knowledge from peers and students. They also considered patients as a source of knowledge.

Personal study is used as a pedagogical knowledge acquisition technique in different ways, including the study of scientific evidence, the study of educational single sheet, the study of reference books, the study of articles, study of novels, study of memories of successful teachers, the study of teachers' history, and study of psychological books. In this regard, a participant mentioned:

"A method that helped me acquire the medical education knowledge was studying the history of teachers and those with similar jobs." (Participant 19)

Virtual learning is another pedagogical knowledge acquisition technique that is carried out individually. Participants used a variety of virtual learning methods (e.g., E-mail, Instagram, university website, e-journals, audio files, educational sites, webinars, web-based education, social media, eBooks, and listening to audiobooks) to gain pedagogical knowledge individually. A participant affirmed:

"I think the cyberspace is a great opportunity for increasing knowledge, motivation and improved performance in the field." (Participant 8)

Use of experiences was one of the main pedagogical knowledge acquisition methods. Participants applied different ways to benefit from experiences, including

the acquisition of knowledge obtained from work experience, experience gained during education, faculty experiences, and using the experiences of colleagues. In fact, they learn the tacit knowledge in this way. Accordingly, one of the subjects expressed:

"Specifically, my experience is what I have learned during my education, and I use the same method of education and exam-taking for my students." (Participant 1)

Nonofficial or unconventional education was another knowledge acquisition technique. Teachers used unconventional methods such as watching movies, TV series and documentary movies, Facebook, Ted Talk, YouTube, socialization with model teachers, visits and experiences of family members to gain knowledge. In this respect, one of the participants pointed out:

"Educational videos on these issues are very useful. One example would be Ted Talks, which have become very popular. One can really learn from these people." (Participant 19)

Acquiring knowledge from peers was another pedagogical knowledge acquisition method. In this regard, some of the approaches included participation in classes of other teachers and experts in other fields, getting tips from colleagues, observing the work of colleagues, morning report, lesson study, and asking a colleague and talking in the clinical department. One of the subjects asserted:

"For example, I ask other more experienced teachers about how they deal with naughty students in the class and they share their experiences with me." (Participant 17)

Acquiring knowledge from students was another pedagogical knowledge acquisition method. According to the participants, students should be considered as a factor that leads to the personal development of teachers. One of the subjects expressed:

"In my own classes, I learn a lot from my students. For instance, if a student suggests a technique, I will definitely implement it to see whether it works or not and I will definitely apply it if it is successful." (Participant 16)

The subjects also recognized **patients** as a source of pedagogical knowledge acquisition and considered them as a book, from which they could learn a lot of things.

"Our patients are in fact a book, both scientifically and morally. I have learned this {communication skills and ethics} from my patients." (Participant 6)

B) Professional Education Strategy

Professional education strategy includes official measures planned and implemented by the organization in order to lay the foundation for the improvement of teachers' pedagogical knowledge. According to the participants, some of these measures included holding educational courses (e.g., workshops and seminars), academic education, providing medical education specialists to lay the foundation for knowledge acquisition, and involving teachers in professional settings.

"I learned all the things that I learned of the workshops. They just have to be held when we are able to attend." (Participant 4)

Academic education is another technique to have access to valid knowledge in the field of pedagogical knowledge. Participants described academic and formal education as passing credits related to medical education in graduate courses and declared that any person who wants to be a teacher should pass these credits and only these people will be used as instructors in universities. Teachers believed that if education starts with low knowledge about pedagogical knowledge from the beginning, not only the quality of learning decreases but also teachers perform by trial and error and consider themselves to be needless of pedagogical knowledge after a while. In this regard, one of the participants stated:

"We can start from the beginning of assistant education and train these individuals to become a teacher from there." (Participant 20)

While it is actually done individually and is considered as an individual strategy, **acquiring**

knowledge from experts is considered a professional education strategy since benefiting from medical education specialists requires the use of these specialized forces by the organization. This method was recognized as a valid and useful knowledge acquisition technique in the field of medical education. The teachers acquired the necessary pedagogical knowledge by talking to experienced teachers, asking questions from experts. In fact, experienced teachers or professors have tacit knowledge and specialists have explicit academic knowledge. In fact, experienced teachers or professors have tacit knowledge, and professionals have explicit academic knowledge, and they can work together as a specialized source of pedagogical knowledge. One of the participants stated:

"...I learned the clinical education methods and how to implement them more efficiently from medical education experts..." (Participant 4)

Regarding communication with experienced teachers, one of the participants stated:

"An experienced teacher in the field of education could be a reference." (Participant 6)

Education in professional settings: another pedagogical knowledge acquisition method is teacher's activities in professional environments in the field of medical education. According to the subjects, these environments provide them with practical pedagogical knowledge during the activity. In this regard, participants referred to in-service training and activities in Edc units and learning while working in scientific olympiads, etc. However, working in these environments requires the participation of teacher on behalf of the organization. In this respect, one of the subjects expressed:

"When I came here, I started learning how to check clinical reasoning during the Medical Olympiad." (Participant 1)

Restrictions on the Acquisition and Identification of Teacher Knowledge

Restrictions on the acquisition and identification of teacher knowledge include factors and situations that act as barriers to the identification and acquisition of pedagogical knowledge and lead to the most important concepts of teachers, including shortage and dispersion of pedagogical knowledge. According to the participants, these factors include are, as follows:

1) Knowledge Egocentrism

Some of the instructors complained about the way of thinking governing medical sciences, which considers pedagogical knowledge as personal wealth, and the notion of knowledge that dominates the culture of teachers in medical sciences. In this regard, one of the teachers expressed:

"Whenever we discuss a topic (in group education), everyone expresses their own perspective and we do not like to be opposed since we all think that we are right." (Participant 3)

2) Inadequate and Improper Learning of Pedagogical Knowledge

According to the experiences of instructors in the field of medical sciences, pedagogical knowledge is not taught in most cases. Therefore, inadequate base knowledge is a barrier to the acquisition of pedagogical knowledge. In this regard, one of the subjects mentioned:

"We are like a patient who does not know that there is a treatment for sickness because we do not know where to find this treatment..." (Participant 14)

3) Lack of Search for Pedagogical Knowledge

During expressing their experiences, most subjects mentioned that teachers do not seek pedagogical knowledge for their own education and do not attend educational courses and meetings with an emphasis on specialized knowledge as the main knowledge required by the teacher. One of the instructors asserted:

"I never passed a specialized course in the field of education, I never searched for it. I believe that being scientifically strong is enough for an instructor..." (Participant 9)

4) Lack of Balance between Multiple Teaching Responsibilities

According to most of the participants' experience,

instructors in the field of medical sciences were unable to create a balance between multiple responsibilities and dedicate most of their work to research and treatment for any reason. In this regard, one of the subjects affirmed:

"Most of us do not think about this issue during the day in order to teach it. When we see there are a hundred patients, we teach the two-three cases and then we ask the students to visit all patients. The point is that the flow of patients never stops and also we have to focus on research and other areas." (Participant 3)

5) Lack of Optimal Time Management

According to the experiences of some of the instructors, lack of time management was one of the main barriers to pedagogical knowledge acquisition. One of the subjects expressed:

"We do not have sufficient time to talk to our colleagues. There is no opportunity for us to sit down and talk to each other." (Participant 17)

Pedagogical Knowledge Acquisition and Identification Skills (Causal Conditions)

According to the subjects, a prerequisite for identifying and acquiring pedagogical knowledge is the application of skills such as seeking and gaining knowledge, the use of experience, effective interaction, and computer skills. In this regard, instructors considered high skills in seeking knowledge from various sources, inquiry, mastery of international language, and identifying knowledge bases as the skills required for knowledge seeking and acquisition. In this regard, one of the participants mentioned: *"I have to learn how to reach articles. Searching is also very important and we need to master this area." (Participant 5)*

In terms of the skill of learning from students' experiences, one of the teachers marked:

"I told my students that I never stop learning since I am constantly learning from them. In other words, whatever they do provides me with feedback and shows me that I am still learning. For instance, one of the students described a tool that I have never seen before and I asked them to describe it…Then I found all of its different models and I learned something new. However, one should know how to learn from students." (Participant 24).

Teachers found it necessary to master the use of various technology tools to acquire and share the teaching. In this regard, a subject mentioned: "today, a basic knowledge that every instructor should know is how to work with a computer…" (Participant 27).

Consequences of Identification and Acquisition of Pedagogical Knowledge

Implementation of strategies to identify and acquire pedagogical knowledge had consequences such as improved education quality and transformation and enhanced satisfaction and learning of students. One of the teachers stated:

"It has a great impact. I mean, students can really enjoy a class, whose instructor knows the knowledge of medical education. In fact, they do not want a class like that to be over." (Participant 18)

Regarding learning, one of the subjects asserted:

"Learning is more efficient when an instructor knows how to teach and take exams…Eventually, we will achieve the desired educational goals in this field." (Participant 9)

Discussion

In the present study, the participants recognized pedagogical knowledge identification and acquisition to depend on the existing organizational, individual, and cultural contexts and conditions. Various studies have emphasized these factors, including the studies by Kim and Park (2018), which emphasized effective leadership, and by Omerzel et al. (2011) and Azizi Khalili & Hosseinpour (2018), which emphasized evaluation as organizational factors affecting knowledge acquisition (23-25). In addition, Abbas (2018) and Rotgans & Schmidt (2017) emphasized individual contexts including individual interests and beliefs (26, 27). According to Szymańska (2016) and Mittal & Bhatia (2014), cultural contexts played a significant role in the identification and acquisition

of pedagogical knowledge and even affected the individual context in some cases (28). According to the results of the present study, teachers can obtain their necessary pedagogical knowledge using individual and professional strategies. In other words, there are various other individual learning contexts (e.g., use of experience) in addition to the foundations laid by the organization through planning and investing in order to improve pedagogical knowledge in instructors (13).

Will (1995) argued that while the knowledge obtained from experience is important, it is not sufficient (29). However, transferring this knowledge to teachers before the start of their teaching could play a significant role in the development of new skills and interest in teaching (31). In the present study, instructors emphasized the importance of the academic method before teaching since most of the novice clinical teachers had problems in the area of clinical education (31, 32). For many years, there has been a weak hypothesis stating that expertise in clinical practice will eventually turn into the skill of clinical teaching. Nonetheless, studies showed that content expertise alone is not enough to ensure the excellence of education (33). On the other hand, the importance of professional strategies cannot be ignored since, in addition to acquaintance with the base knowledge of medical education, the application of individual strategies requires individual motivation and interest, which will not be the same in all people and its effectiveness has been confirmed (17-19). In the present study, knowledge search skills, experience utilization skills, effective interaction skills, and computer skills were introduced as causal conditions for identifying and acquiring knowledge. In the present study, knowledge search skills, experience utilization skills, effective interaction skills, and computer skills were introduced as causal conditions for identifying and acquiring knowledge, all of which affected instructors' performance according to the review of the texts (34).

According to the results of the current research, the major concern of instructors was the shortage and dispersion of pedagogical knowledge in clinical education, which was pointed out in numerous studies (14, 15, 35, 36). In addition, limiting factors that increase this concern have been pointed out in some studies; for instance, Faradillah & Ermatita (2020) introduced knowledge egocentrism as crab mentality, recognizing it as a limiting factor in the field of knowledge acquisition from colleagues (37). Sonia (2017) mentioned experimental performance in clinical instructors (29). Pointing out the imbalance between multiple teaching responsibilities, Olasoji et al. (2019) argued that clinical instructors are expected to be creative and effective teachers, and at the same time, successful researchers and healers of patients. There are more challenges (e.g., administrative and leadership responsibilities) for some of these individuals, which lead to the limited acquisition of pedagogical knowledge (36). According to the results of the present study, the application of pedagogical knowledge acquisition and identification strategies improved the quality and transformation of education and enhanced students' learning and satisfaction. In fact, identifying and acquiring knowledge, which is the basis of teachers' development, will lead to improved teaching performance and better results for students. In this respect, Steinert et al. (2016) argued that the development of instructors will lead to improved teaching performance and better results for students and the development of teachers' professions will occur through knowledge acquisition (17).

Conclusion

Overall, instructors deal with contexts, strategies, limitations, and consequences of pedagogical knowledge acquisition in clinical education on a daily basis. However, an important point is that the two professional education and individual learning strategies together can provide the pedagogical knowledge required by teachers in order to provide

an effective education for students. Therefore, it is not possible to lay the foundation for the growth and development of pedagogical knowledge of teachers only through their participation in medical education courses such as fellowships or postgraduate courses. Rather, it is necessary to develop opportunities for individual learning by creating motivation and interest of teachers, or in other words, to provide a context for the identification and acquisition of knowledge. In this respect, it is necessary to consider the improvement of professors' skills in using technology and mastery of international language as empowerment programs for professors in medical universities to take advantage of the individual strategy in pedagogical knowledge acquisition.

Moreover, attention should be paid to employment and promotion laws and instructions and incentive policies in order to realize the acquisition of pedagogical knowledge by teachers. In addition, techniques such as establishing a knowledge café and holding storytelling sessions can contribute to the enhancement of the cultural context for knowledge acquisition. One of the major drawbacks of the present study was a low possibility of generalization of results due to the nature of qualitative research. Therefore, it is suggested that the effect of various pedagogical knowledge acquisition methods on the performance of instructors be assessed. In addition, it is recommended that a survey review of limiting and facilitating factors of pedagogical knowledge identification and acquisition be considered in future studies.

Acknowledgments

This article was extracted from a PhD thesis in curriculum planning, Faculty of Educational Sciences and Psychology, Birjand University of Medical Sciences (Code: 1431210) And with the financial support of the National Center for Strategic Research in Medical Education, Tehran, Iran, with the project number 970451. Hereby, we extend our gratitude to all esteemed instructors for assisting us in performing the present research.

Conflicts of Interest: The authors declare that there are no conflicts of interest.

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