REVIEW ARTICLE

Pedagogical knowledge management and its application in Medical education: A synthetic research study

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Background: Pedagogical knowledge management is the management of knowledge and experiences in teaching, assessment, learning theories, classroom management, and other areas of education. An analytical study of the literature can be helpful in understanding the pedagogical knowledge management approach. Thus, this study aims to perform a synthesis research on the efficacy of pedagogical knowledge management and to explain its applications and strategies.

Methods: The method of this study is the qualitative research synthesis. Data was gathered through searching library resources, theses, and articles in the Google Scholar, Science Direct, SID, Springer, IEEE, and Eric databases. In order to search the domestic and foreign databases, keywords have been used without time limits. A total of 3227 published research papers were identified and 66 of them were selected for analysis.

Results: The results of analyzing different studies showed that knowledge management is effective in the field of education and is widely used in the professional development of professors, lesson study, upgrading qualification, curriculum development, evidence-based education, lifelong learning, teaching design, and clinical reasoning. According to the results of the present research, among approaches regarding knowledge management in education are establishing learning communities, storytelling, knowledge management platforms such as wiki, web2, blogs, etc.

Conclusion: The results of this study showed the widespread use of pedagogical knowledge management in all areas of education; therefore, identification and implementation of practical strategies such as virtual and real learning communities of professors, storytelling, and the establishment of thought rooms for the proper management of pedagogical knowledge are suggested.

Keywords: Pedagogical Knowledge Management, Medical Education, Synthetic Research

الإدارة التربوية وتطبيقاتها في التعليم الطبي: دراسة توليفية

الخلفية والهدف: إدارة المعارف التربوية ، وإدارة المعرفة والخبرات في التدريس والتقييم ، ونظريات التعلم وإدارة الدروس ، وغيرها من مجالات التعليم. يمكن أن تكون الدراسة التحليلية للبحوث التي أجريت في هذا المجال مفيدة في فهم نهج إدارة المعرفة التربوية. ولذلك ، فإن الغرض من هذه الدراسة التوليفية هو تجميع فائدة الإدارة التربوية وشرح تطبيقه وحلوله.

الطريقة: طريقة هذه الدراسة هي توليف البحث النوعي. تم جمع البيانات من خلال البحث في موارد المكتبات والأطروحات والمقالات في قواعد بيانات **Google scholar** و **Science direct** و **SID** و **Springer** و **IEEE** و **Eric**. تم استخدام الكلمات الأساسية دون حدود زمنية للبحث في قواعد البيانات الداخلية والخارجية. وتم تحديد ما مجموعه ٣٢٢٧ ورقة بحثية منشورة وتم اختيار ٦٦ منها للتحليل والدراسة .

النتائج: أظهرت نتائج دراسة وتحليل الدراسات والبحوث أن إدارة المعرفة فعالة في مجال التعليم وتستخدم على نطاق واسع في تطوير الأساتذة وتطوير المؤهلات وتطوير المناهج والتعليم والتعلم مدى الحياة وتصميم الدروس والأفكار. استنادًا إلى نتائج البحث ، يمكن أن تشكل الاستراتيجيات المقترحة لاستخدام إدارة المعرفة في المعرفة إجتماعات التعلم ، ورواية القصص ،ورواية الحكايا ومنصات إدارة المعرفة مثل الويكي ، وويب ٢ ، ومدونات الويب وغيرها.

الخلاصة: تظهر نتائج هذه الدراسة الاستخدام الواسع لإدارة المعرفة التربوية في جميع مجالات التعليم ، وبالتالي ، تحديد وتنفيذ الاستراتيجيات العملية مثل تنفيذ إجتماعات حضورية ومجازية لأعضاء هيئة التدريس ، ورواية القصص ، واقتراح افتتاح غرفة التفكير للإدارة السليمة للمعرفة التربوية.

الكلمات المفتاحية: التعليم الطبي ، البحث التجميعي ، إدارة المعرفة التربوية

مدیریت‌دانش پداگوژیک و کاربرد آن در آموزش پزشکی: یک مطالعه سنتزپژوهی

زمینه و هدف: مدیریت دانش پداگوژیک، مدیریت دانش و تجارب در زمینه تدریس، ارزشیابی، نظریه‌های یادگیری و مدیریت کلاس و سایر حیطه‌های آموزش است. مطالعه تحلیلی پژوهش‌های انجام شده در این حوزه برای فهم دقیق کابرد مدیریت دانش پداگوژیک می‌تواند راه‌گشا باشد. بنابراین هدف مطالعه حاضر سنتزپژوهی اثربخشی مدیریت‌دانش پداگوژیک و تبیین کاربرد و راهکارهای آن است.

روش: روش این مطالعه سنتزپژوهی کیفی است. داده‌های مورد نیاز از طریق جستجو در منابع کتابخانه‌ای، پایان نامه‌ها و مقالات موجود در پایگاه‌های اطلاعاتی Googlescholar ،sid ،Sciencdirect ،IEEE ،Springer ،Eric جمع‌آوری شد. به منظور جستجو در پایگاه‌های اطلاعاتی داخلی و خارجی از واژگان کلیدی و بدون محدودیت زمانی استفاده شده است. تعداد 7322 مورد پژوهش منتشر شده شناسایی و از میان آنها ۶۶ مورد پژوهش جهت بررسی و تحلیل انتخاب شد.

یافته ها: نتایج حاصل از بررسی و تحلیل مطالعات و پژوهش‌های انجام شده نشان داد که مدیریت دانش در حوزه آموزش اثربخش بوده است و در توسعه‌حرفه‌ای اساتید، درس پژوهی، ارتقاء صلاحیت، برنامه‌درسی، آموزش‌مبتنی برشواهد، یادگیری مادام‌العمر، طراحی‌آموزشی و استدلال‌بالینی کاربرد گسترده‌ای دارد و از راهکارهای پیشنهادی در زمینه بکارگیری مدیریت دانش در آموزش طبق نتایج پژوهش‌ها می‌توان به تشکیل اجتماعات یادگیری، داستان‌سرایی و قصه‌گویی، پلتفرم‌های مدیریت دانش نظیر ویکی، وب۲، وبلاگ‌ها و.. اشاره کرد.

نتیجه‌گیری: نتایج این مطالعه کاربرد گسترده مدیریت دانش پداگوژیک را در کلیه حوزه‌های آموزش نشان می‌دهد. لذا شناسایی و اجرای راهکارهای عملی نظیرراه‌اندازی اجتماعات یادگیری حضوری و مجازی اساتید، داستان‌سرایی و خاطره‌گویی و راه اندازی اتاق فکر جهت مدیریت صحیح دانش پداگوژیک پیشنهاد می‌گردد.

واژه های کلیدی: آموزش پزشکی، سنتز پژوهی، مدیریت‌دانش پداگوژیک

Pedagogical managementطریقوں سے علم و دانش کی تدبیر کرنا اور طبی تعلیم میں اس سے استفادہ کرنا۔ایک تحقیق

بیک گراونڈ: پیڈا گوژیک تعلیمی تدابیر سے مراد تدریس کے میدانوں میں تجربہ، ایوالویشن، تعلیمی طریقوں کے بارے میں نظریات اور کلاسوں کی مینجمینٹ نیز دیگر علمی اور تعلیمی میدانوں کی تدابیرہیں۔

اس سلسلے میں انجام شدہ تحقیقات پیڈاگوجیکل تعلیمی تدابیر کو سمجھنے کے لئے معاون ثابت ہوسکتی ہیں۔ اسی وجہ سے یہ تحقیق انجام دی گئي ہے اور اس کو سمجھنے میں مفید واقع ہوتی ہے۔

روش: اس تحقیق میں ڈیٹا کتب خانوں، تھیسیس اور مقالات میں سرچ سے انجام دی گئی اس کے علاوہ و مقالات موجود در پایگاہہای اطلاعاتیGooglescholar، Springer,IEEE،Sciencdirect,sid، Eric نامی سائیٹوں سے بھی استفادہ کیا گیا۔ان سائٹوں میں کلیدی الفاظ سے استفادہ کیا گیا اور ٹائم کی کوئي قید نہیں لگائي گئي تھی۔ اس سلسلے میں سات ہزار تین سو بائس تحقیقات سرچ کی گئیں، ان میں سے چھیاسٹھ تحقیقات کو اینالائز کرنے کے لئے منتخب کیا گیا۔

نتیجے: چھیاسٹھ تحقیقات کو اینالائز کرنے سے یہ پتہ چلتا ہے کہ تعلیمی سرگرمیوں میں تدابیر نتیجہ خیز ثابت ہوئي ہے۔اس روش نے اساتذہ کی پیشہ ورانہ صلاحیتوں میں اضافہ کرنے، تحقیقاتی روشوں کو ارتقا دینے، نصابی پروگرام کو آگے بڑھانے نیز شواہد و ثبوت پر مبنی مطالے کو جلا بخشنے، عمر بھر پڑھنے کے طریقے سکھانے، اور تحقیقات کے نتائج سے آگاہ ہونے کے میدانوں میں بے پناہ کامیابی حاصل کی ہے۔

سفارش: اس مطالعے سے پتہ چلتا ہے کہ پیڈا گوجیگ مینجمنٹ سے تمام تعلیمی میدانوں میں استفادہ کیا جاسکتا ہے۔لھذا کلاسیں لگانے اور سائبر کلاسیں لگانے نیز اپنی یادیں سنانے جیسے طریقوں سے آشنائی بے حد مفید واقع ہوسکتی ہے اس پر کام کیا جانا چاہیے۔

کلیدی الفاظ: طبی تعلیم، تعلیمی تدابیر پیڈاگوجیک روش

INTRODUCTION

The quality of higher education is of a great importance especially in medical education. Improving educational approaches, planning, and evaluation will improve students learning, which in turn, will lead to health promotion (1). Knowledge about the teaching process, cognitive and social theories of learning, as well as the perception of how to apply these theories in classrooms, is called the pedagogical knowledge (2). This knowledge contributes to improving the quality of learning by professors. Therefore, it can be admitted that professors are intrinsically knowledge workers (3, 4) who produce and use knowledge and information to teach their students. As pedagogical knowledge workers, professors can share their experiences with other peers. However, professors are in isolation in their classrooms, faculties, and their groups, hence they are prevented from the development of knowledge (5). The results of a narrative study showed that in universities, in terms of professionalism and non-professionalism, content knowledge (CK) was usually considered, and most professors taught in the form of experiment and error with information gained from observing their own professors. Studies have shown that professors have reported that one of the most important ways to improve the knowledge of medical educators is sharing and organizing these educational experiences (6). These processes in which a person uses to collect, organize, store, search, retrieve, and share knowledge in his daily activities is known as personal knowledge management (7).

Liebowitz and Wilcox (1997) emphasized on the importance of knowledge management system in lifelong learning (8). According to Zhao (2010), knowledge management, by improving the professional development of instructors, seeks to make the knowledge available in people's minds more obvious (9). Knowledge management can help improve the quality of teaching by acquiring and sharing knowledge in teaching and learning (10). There are numerous studies in knowledge management of teachers such as the studies by Wang et al. (2018), Qiao et al. (2013), Wang and xu (2012), ZHAO and XIAO (2009), Yang (2008), Liu (11-15); however, it seems that the term of pedagogical knowledge management was first proposed by Akhterov et al. (2010). These researchers considered knowledge management as a system that provides the opportunity to use existing knowledge to decide on the strategic development of an educational process (16). In another study done by the same researcher in 2013, the term "pedagogical knowledge management" was mentioned to analyze the structure of the knowledge management information system for professors of the technical school (17). Pedagogical knowledge management is managing pedagogical knowledge in all areas of the educational process, such as evaluation, teaching, learning experiences, classroom management, etc., which provides the basis for effective teaching quality. However, the review of other studies has shown that pedagogical knowledge management in medical sciences has not been addressed in practice and theory. Clarifying the application of this concept provides the basis for its use in practice. Therefore, we decided to extract and explain the various applications of pedagogical knowledge management in medical education by referring to different texts.

METHODS

This research was carried out with qualitative synthetic research method and aimed to achieve integrated knowledge in the field of pedagogical knowledge management. Synthetic research is a type of research which results in integrated knowledge; a knowledge that brings together the diverse and scattered studies in order to cope with the needs of the field of actions. In order to achieve a knowledge that is capable to solve the current problems and issues that require planning or adoption of practical decisions, the integrated study evaluates and combines ongoing and finished studies (18). To study the history of other research and to collect data tailored to the purpose of the research, library resources, theses, research projects and articles of Google Scholar, Science Direct, SID, Springer, IEEE, and Eric have been used in this study. Searching for articles was done based on the keywords of Pedagogical Management, Pedagogical Knowledge, Pedagogical Pedagogy, Knowledge Management and Medical Education, Professional Development Medical Education, also their Persian equivalent in Google Scholar and SID. In all databases, the article's title was searched without time limit until 2018. All original research or reviews published in Persian or English were included in the present study. Articles related to the present subject were selected and reviewed, as well as articles that met the inclusion criteria and their full texts were available, entered the process of quality review through the QUESTS benchmark. Based on this criterion, each article was evaluated based on six criteria: Quality, Utility, Extent, Strength, Target, and Field. The indices A, B and C were given to each of them and the results were included based on them. Articles with A and B indices were studied. The inclusion criteria were the suitability of the title of studies with the goals of the present study, the language of the research (Persian and English) and ranking as A and B from the QUESTS criterion and credibility of the journal, and the repetition of the research title and resources with low credibility such as conference articles and books and index C articles were considered as a criterion as the exclusion criteria based on the QUESTS criterion. The analysis of the findings was done through thematic analysis method. Thematic analysis is a method for recognizing, analyzing and reporting the patterns in the qualitative data. This method is a process for analyzing textual data and converting the scattered and varied data into rich and detailed data (19). Therefore, in this study, the general themes of scientific articles have been reported and analyzed.

RESULTS

In the initial search, 3227 articles, books and theses were obtained with respect to the present title. After removing duplicates and reviewing the articles, 381 of them (Figure 1) were introduced into the quality review process for QUESTS benchmarking. In total, after reviewing full texts, 66 articles were used to write the content of this research.

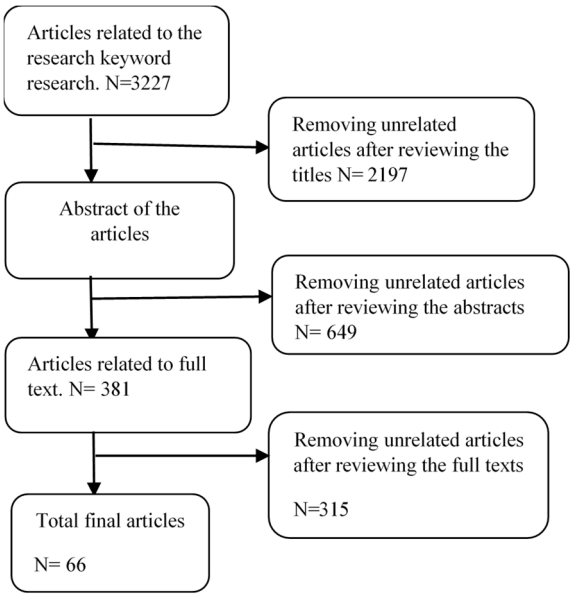

Figure 1. Selection, Refinement, and Organization of the articles

A review of these studies showed that no study has ever been conducted in the field of pedagogical knowledge management in medical sciences. However, by studying knowledge management in education, its broad usage in medical education can be deducted, which is discussed later on.

Application of pedagogical knowledge management

1) The application of knowledge management in the lesson study process

The most important way to improve educational standards is to improve the quality of teaching in the classroom, and one of the strategies in this area is to conduct lesson study (20). Lesson study is a new approach to the development of teachers' knowledge and the quality of education, which has been first developed for primary school teachers in Japan. In higher education, this model can also lead to the development of professors and ultimately improve the quality of education. In the process of lesson study, faculty members will have the opportunity to collaborate and interact in planning, conducting, and evaluating the process with classroom issues, find answers and apply them in practice, and end up with a grouped assessment of their educational work. They practice in groups, exchange and interact with each other, learn from each other, and, in addition to teaching the theoretical foundations of teaching and learning, they learn the academic and applied skills related to the teaching-learning process, the assessment of teaching methods, self-assessment and learning activities (21). In fact, they acquire and enhance their pedagogical knowledge. Cheng and Yang (2014) and Cheng (2015) used the Nonaka and Takeuchi model of knowledge management for lesson study of teachers (22,23) and introduced it as a major factor in promoting pedagogical knowledge.

2) The application of knowledge management in life-long learning:

Life-long learning is the solution to many problems that professors face in the educational process (24), as well as is one of the most

important issues that most countries consider as the most important factor in education (25). Knowledge management leads to lifelong learning in professors, because professors can continuously improve their knowledge and skills through their knowledge management (26). In knowledge management, professors learn how to gain knowledge, share and organize it, and ultimately use it. Thus, in current world, where knowledge is growing and changing, they can gain the required knowledge and the way to apply it, and by providing knowledge sharing, by creating synergy, they can provide the context for their own knowledge development (25).

3) Knowledge Management as a tool for the professional development of professors:

As the most influential factors in learning students, professors need professional development. Knowledge management in education, by identifying, sharing and validating knowledge can improve professors' performances (27). This improvement can be done through the creation and sharing knowledge (28), i.e. the exchange of educational experiences among professors and the sharing of knowledge and professional skills that lead to learning and, as a result, their professional development in education (29). Also, by enhancing innovative abilities (30) of professors, knowledge management provides the context for their professional development. One of the uses of knowledge management in professional development is the creation of a training portfolio to enhance the ability of professors (31).

4) Application of Knowledge Management in Curriculum Development

If we look at the implementation process of the curriculum, professors will no longer be considered as presenters, who are fully aligned with the curriculum, and do not execute the curriculum without any changes according to the instructions; however, from this perspective, the professors can also play a role in curriculum planning (32). On the other hand, in addition to major curriculum planning, curriculum planning for the classroom, which is an important component of pedagogical knowledge, is required for the acquisition of multiple knowledge in need analysis and analysis of the existing curriculum (33). Knowledge management in curriculum can be used in the curriculum planning process (34), curriculum designing to achieve responsive curriculum (35,36), curriculum assessment (37), and curriculum development (38).

5) Application of Knowledge Management in Evidence-Based Education

Today, insufficient use of documented knowledge has led to a gap in acquiring knowledge. The reason for this problem is not the lack of knowledge resources, but the inadequate use of knowledge due to the lack of a comprehensive framework for storing and updating knowledge, so practical information or knowledge is not available at the right time and place of

decision making (39). This application in medical sciences, in addition to influencing the teaching performance of professors, refers to the therapeutic performance of professors which is also the basis for student learning. Davis (1999) believes that the purpose of evidence-based education is to use educational research and to create objective evidence through scientific methods for applying in the quality of education (40,41). This function is influenced by their experiences, the outstanding performance of other professors in medical sciences, namely, treatment, and is traditionally based on the experience and scientific knowledge gained from their studies and limited retraining courses, while it is passed on to the student; however, in evidence-based medicine, scientific data must be collected and transformed into comprehensive knowledge to make clinical decisions wiser and less risky. Knowledge management helps professors of medical sciences to be as health care providers in their individual clinical experiences while having skillful solutions for their visual problems (tacit knowledge), and finding structured information inside and outside the organization such as evidence-based guidance, studies, using explicit knowledge for clinical decisions (42), and transfer these information and skills (tacit knowledge) to students.

6) Application of knowledge management in educational design

Educational design provides a systematic process to use educational principles in planning educational events (43). The knowledge management system classifies the basic knowledge based on learning goals in different dimensions of learning and at different levels; however, with an emphasis on the knowledge structure, it provides the most suitable educational methods that are appropriate for students in the context of learning objectives (44-46). Reverse learning, as a new educational method, can be seen as an example of educational design, in which knowledge management plays an essential role. In reverse learning, students learn online content and then respond to questions that are designed by the professors and then participate in class discussions and exercises. This model is in contrast to the traditional one, in which the teacher offers lectures in the classroom, and learners perform homework at home, which is why it is referred to as the reverse class (47). In reverse education, knowledge is obtained from various sources by students (converting explicit to implicit knowledge), then it is exchanged in the classroom (converting implicit to explicit knowledge) that is simultaneously evaluated by the professor and other students, and thus, proper knowledge is formed in the minds of students (explicit knowledge to implicit). In fact, the reverse learning approach incorporates a complete knowledge management system (48).

7) Application of knowledge management in promotion of professional qualifications (clinical reasoning and ...)

One of the qualifications needed by professors in medical sciences' universities is clinical reasoning; so that they can transfer it to students while using it in the health process. Knowledge management can be used as a tool for clinical reasoning in the process of transferring knowledge (49).

Proposed Methods of Using a Knowledge Manager in Education:

Many methods can be used to apply knowledge management in education, including storytelling, creation of knowledge management platforms, knowledge management system based on Web2 theory, blogging, and wiki, as well as formation of learning communities. These methods are briefly presented.

1. Storytelling

One of the proposed methods is storytelling; storytelling by professors leads to rethinking experiences (50,51). This facilitates the self-assessment of the professors and thus the improvement of the educational quality. Storytelling also provides a platform for sharing knowledge and experiences (52,53). It can also provide the context for the transfer and creation of knowledge (54).

2. Knowledge Management Platforms

Knowledge management systems provide the context for knowledge acquisition, and make storage, organization and exchange of knowledge available (55). These systems include Web 2 (56), wikis (57-59), blogs (60,61), and social networks (62). Using these systems leads to educational justice and appropriate education for deprived areas. These systems also provide the relationship between professors, and consequently, their synergy, in the educational process.

3. Establishing a learning community

At the Carnegie Endowment, Schulman brought together a group of professors who worked on research in various areas of teaching and learning (63). He set out a developmental pattern for these learning communities. In this development model, instead of emphasizing on subjects, the emphasis had been placed on transferring the individual and social experiences of teachers into a process of group and participatory thinking (64). Therefore, knowledge management could shape this learning community in two forms, either virtual or in person which led to the promotion of teachers' pedagogical knowledge. Researches on pedagogical knowledge management (65-67) showed that research in this field has been done in education and attention has not been paid to the management of pedagogical knowledge in higher education, especially in medical education.

DISCUSSION

The purpose of this study was to examine the application of pedagogical knowledge management in medical sciences in various texts. All articles were retrieved and searched using QUESTS criteria, and only articles with good quality were used in this study, which showed there was a certainty about the results of these studies. The findings of this study, based on the analysis of the researches conducted, indicated that pedagogical knowledge management in medical sciences can be used in various fields of medical education from the professional development of professors, curriculum, lesson study, life-long learning, evidence-based education, and evidence-based medicine. The most important methods of using pedagogical knowledge management can be the creation of learning communities, the design of learning experiences, and storytelling. As the results indicate,

knowledge management leads to the professional development of professors (27-29), and since the professional development of professors, make the improvement of the quality of education possible (29,30), knowledge management will be essential in the educational process. In fact, knowledge management can contribute greatly to professional development, and by establishing a conscious path of production and creation of knowledge, knowledge storage, knowledge sharing and application, it organizes the professors' experiences as a pedagogical knowledge and enables professors to convert knowledge and experiences into products, services, and processes that can be used by other professors (68).

The results of this study showed the application of knowledge management in lesson study. Coenders and Verhoef (2018) introduced lesson study as a methodology for the development of experienced and inexperienced professors (69). Through lesson study, knowledge management process is applied, meaning that knowledge is acquainted, exchanged, evaluated, and applied. In fact, lesson study provides a framework for rethinking and developing the teacher's practice that leads to the creation of new and critical knowledge (70).

Life-long learning was also a result of the application of knowledge management in education (71). Pauleen et al. (2009) believed that knowledge management in people enhances the ability to absorb knowledge, using technology skillfully, retrieve knowledge, share knowledge and gain knowledge from others, which lead to information literacy in individuals and make them life-long learners (72). In addition, one of the characteristics of life-long learning is using knowledge which is one of the fundamental components of knowledge management (73). Marzo et al. (2016) believed that the use of knowledge will create a self-directed learning context that will influence the development of lifelong learning (74).

The results of this study showed the application of knowledge management in educational design (43-47). Due to the explosion of knowledge and the consequent change in the knowledge and skills required by students, the need for new methods and knowledge in the field of medical education, also the use of knowledge management in educational design of education provides a platform for using of modern design education.

The application of knowledge management in curriculum design was another result of this study (32,33). Knowledge management will provide the knowledge needed to design a curriculum. Of course, there are challenges in applying knowledge management in curriculum designing and they have been emphasized in different research. The first challenge is that there are no standards for applying knowledge management in the curriculum; and second, the curriculum specialists and the curriculum accomplishers who are professors of universities are not well trained in knowledge management, and there are some deficiencies in this regard (63,75).

The findings of this study also showed that knowledge management is used in evidence-based education. Masters et al. (2018) argued that the effectiveness of education without the use of evidence would not be feasible because the professors should use evidence to decide on all stages of education, including choosing the appropriate strategy, monitoring and learning progress; it is necessary to search for, evaluate and apply knowledge, or to manage them in the sense of its pedagogical knowledge (76). The necessary points to be considered in this regard are the professors' practices, both traditionally and evidence-based, which are transmitted to the students and shapes the professional practice of the students in the future.

Another finding of this study was the use of knowledge management in the development of professional qualifications, such as the ability of clinical reasoning (49) based on decision-making (77) and the scientific ability (78) which ultimately constitutes the main goal of the educational system in medical sciences while reducing mistakes which are due to inaccurate knowledge that ultimately improves the community's health (79).

The results of this study showed the application of pedagogical knowledge management in the comprehensive development of professors and the development of innovative individuals who are responsible for applying the best evidence in teaching and designing the educational plans. According to the goal of medical education which is improving the quality of health care in the community, the use of knowledge management in the process of medical education will be important. One of the limitations of the present research was the lack of access of the researcher to the full texts of the articles that were appropriate to be included in the study.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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