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The core curriculum and integration in medical education

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Abstract

Background: The current challenges that confront the medical education field have necessitated the need for transformation and revisions in curriculum design practices. In this regard, core curriculum development and integration are examples of such changes. The purpose of this study was to investigate the concepts of core curriculum and integration in the realm of medical education and to explore the relationship between these two concepts.
Methods: This study is a narrative review article. In this study, databases such as Science Direct, Ovid, PubMed, SID, Magiran and Google Scholar were searched using keywords such as core curriculum, integration, medical education, curriculum design and curriculum.
Results: The importance of meaningful learning, organized knowledge and practical knowledge for students of medical sciences requires planning of integrated curricula. This is more accentuated based on the increasing volume of knowledge, educational content, continuous changes in community needs, responsibility to meet those needs and the need for medical students to gain clinical competencies in their profession.
Conclusion: The concepts of core curriculum and integration are very closely linked, with some of the experts in the field of curriculum planning considering integration as one of the forms of designing core curriculum. Indeed, both concepts were developed in response to the overload of knowledge, the need to teach and learn basic and clinical sciences together and the need to create meaningful learning.

Introduction

Based on recent reports, the overall challenges and demand for innovations at all levels of medical education in terms of format and process have been identified.[1] There is a need for a revision in medical education, not only in terms of the changes in our knowledge base, but also in terms of the changes regarding patients, medical practitioners and society in general.[2] One of the most important matters regarding the implementation of proper training is the development of a curriculum that is comprehensive and appropriate.[3] There is also a belief that a curriculum must contain generic knowledge, skills and attitudes. The real challenge that all medical schools are now facing is the delivery and assessment of these learning objectives within an integrated curriculum.[4] In medical education, basic science content that needs to be linked with clinical scenarios is a daunting challenge for beginning learners who have limited or no clinical exposure.[5] Therefore, it is necessary to integrate basic sciences and medical knowl-edge with clinical practice.[6] Another challenge in the realm of medical education that necessitates integration in the curriculum is related to the meaningful learning and organized knowledge of medical students, as knowledge is most effective when organized in a way that matches how the knowledge is being used.[7] Thus, training medical students with basic sciences in line with clinical examples and establishing a link among concepts through integrated presentation of materials are two main approaches. Integration can enhance long-term retention and deeper understanding among medical students.[5] Furthermore, the need to change medical education to include interprofessional educational opportunities that foster a collaborative atmosphere among health professionals[6] and the need to transfer learning by medical students is well-recognized. If clinical examples are introduced to medical students at an early stage of training, they can identify deep features of basic science concepts. This will enable them to elaborate on that knowledge as they progress into clinical

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education.[5] Therefore, medical educators will use a versatile approach that is practical, generic and timeless. When developing a curriculum, in order to tackle the challenges, we should draw our attention to the volume of content and its appropriateness, in addition to integration. This is highly important as many of the current problems are due to the extra content that is embedded in the curriculum.[8] One of the concepts that appeared to respond to the matter of information overload was the core curriculum concept. We should also indicate that considering core curriculum as a way to justify the problem of information overload is not the only response. Core curriculum can enhance social accountability in health and education. Additionally, it meets the growing demands of the public in terms of cost-effectiveness and standards in medical education.[9] Core curriculum and integration are closely connected[10] and are responsible for answering the problems and challenges of information overload, meaningful learning, organized learning and community needs. The relationship between core curriculum and integration is very close, and some researchers consider integration one of the forms of core curriculum.[10,11] Studies show that students who have passed more core content in comparison to their fellows increasingly consider academic schoolwork as boring, lacking meaning and unlikely to be practical later in their professional career. This emphasizes the need to provide medical students with chances in the core curriculum to link their knowledge and skill throughout different subjects and to connect their academic experiences to life on the other side of the school. This is obtained by providing systematic chances to integrate and apply subject matter.[12] Therefore, the purpose of this study was to investigate the concepts of core curriculum and integration in the realm of medical education and to explore the relationship between these two concepts.

Materials and Methods

This study is a narrative review article. In this study, databases such as Science Direct, Ovid, PubMed, SID, Magiran and Google Scholar were searched using keywords such as core curriculum, integration, medical education, curriculum design and curriculum.

Results

The results of the review articles obtained from search databases are organized in three themes: core curriculum, integration and core curriculum and integration.

Core curriculum

It was in the 1960s in North America when the core curriculum concept was first utilized in basic medical education.[9] There was a promotion of this concept by the General Medical Council (GMC). GMC's standing on this concept is a complete integration of pre-clinical and clinical sciences. Medical students gain a mastery over all dimensions of health by learning the theories of science. In line with the theoretical lessons, they must learn and be familiar with the clinical conditions that are indispensable

for their future career.[13] There are many definitions of the core curriculum.[14] Harden and Davis expressed the concept of core in four assumptions: core as essential aspects of each discipline; core as essential competencies for practice; core as a study of only the key disciplines and core as areas of study relevant to many disciplines. Based on these assumptions, matters such as practical competencies, disciplinary aspects and relevant topics can be identified for the curriculum.[9] Kirk proposed that core curriculum contains those traits that all medical students are required to be involved in. The term "core" implies that the core elements of the course make up only part of a student's total program.[15] Blight believes that core curriculum can be related to why, how, when, where and what kind of education is offered. It should also be mentioned that matters such as content and its organization are also related to core curriculum.[16] Some researchers have also organized the core curriculum into three levels of knowledge and skills: must know, should know and nice to know matters.[14] There are different intentions that can be considered for core curriculum at institutional, national and international levels. The core curriculum is flexible and should be revised on a regular basis.[9] There are diverse methods that are available in order to determine what constitutes the core of an educational program.[16] These include Delphi techniques, the Wiseman approach, critical-incident studies, analysis of current practice and job analysis of health care professionals. There are also some factors that should be mentioned: the importance of topics for making decisions to be taken by a doctor, how common or rare the problem is and the generality of a subject in which one can understand in comparison to other topics. It is also crucial to be vigilant that the core curriculum is reviewed and changed from time to time. Early trends and changes in medicine should be reflected by it as well. It is odd if topics such as prevention and health promotion presented in a core curriculum are from 20 years ago.[9] Harden considers the following principles as features of the "core" in the curriculum:

(*a*) How common is it?
(*b*) Does it include essential competencies in order to practice medicine?
(*c*) Does it cover the three areas of knowledge, skills and attitudes?
(*d*) Does it necessitate a high level of mastery from medical students?
(*e*) Is it taken into account based on subsequent stages of the curriculum or phases of education?

Core can be considered as a focal point for teaching the teachers and as a basis for describing specific objectives for primary care attachments.[17] There are 2 different constituents needed to implement change: (1) all students are required to study the proposed core curriculum, and (2) students have freedom to choose among the proposed subject matter.[9] We should also express that one of the weaknesses of the curriculum can be its focus on the integrity of the separate subjects and neglecting or ignoring connections between and among subjects. We should also

give room for students' academic experiences and those beyond school as well.[12]

Integration

The term "integrated curriculum" has grown in popularity in medical education over the last two decades.[5] Based on the following reasons, there is a tendency toward curriculum integration. These can be: (*a*) the growth of knowledge, (*b*) fragmented schedules, (*c*) relevance of curriculum, (*d*) society's response to fragmentation.[18]

One of the goals of integration is to tackle the barriers between the basic and clinical sciences due to the presence of traditional curricular structures. Integration should promote the retention of knowledge and the acquisition of skills based on a repetitive cycle in order to develop concepts.[5] Harden defines integration as "the organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or departments."[19] This organization can happen through a spectrum of different time periods or depths, both within and among subjects. Coming up with an integrated curriculum can be frustrating as it can be time consuming and resource intensive.[5] Integration for this objective is related to identifying prevalent aspects of the content, concepts, applications or ways the subjects must be learned. In this case, integration can help arrange the learning process and the knowledge that is acquired. One point that should be noted in this regard is whether this organization is fostered by students or the person who plans the curriculum. Integration also does not indicate whether learning should happen at the same time or in a sequence.

By the same token, it is not clear whether learning should encompass all parts or just a part of the knowledge, skills and attitudes.[20] Integration can be defined as the dynamic interconnectedness at multiple levels based on recursive interactions. In this regard, the sequential happening and the proximity are vital, but not enough for integration. The focus of integration is on the nature and quality of interactions in the course of time and how they lead to the creation of new patterns that are fluid and complete. The design of the curriculum, how it is integrated and learning are matters in which new patterns emerge from interactions. National and international bodies and medical schools have tried to be responsible regarding the social accountability in order to prioritize health needs by defining the required outcomes and competencies that graduates must obtain in terms of knowledge, skills and attitudes. The terms "competencies" and "outcomes" are broad enough to include teaching, learning and assessment strategies.[21] So far, several categories or forms of integration in the curriculum have been provided by experts. Curriculum models can help researchers better understand the current and intended curriculum formats by using time and the many scientific and clinical disciplines as the two most basic components of a curriculum. The most widespread and accepted categories of curriculum integration in the field of medical education are the following three integration formats: (1) Horizontal integration, (2) vertical integration, and (3) spiral integration.

Horizontal integration: Horizontal integration is defined as integration across disciplines but within a finite time period.

Vertical integration: Vertical integration can be defined as integration across time, trying to enhance education by overcoming the traditional formats between the basic and clinical sciences.

Spiral integration: Spiral integration can be defined as a combination of both horizontal and vertical integration that unifies integration across time and disciplines for both basic and clinical sciences.[5]

Core curriculum and integration

Based on the above-mentioned definitions, we can conclude that integration and core curriculum are interconnected. These two concepts are so closely connected that Shubert, one of the pioneers in the field of curriculum planning, considers core curriculum as one of the forms of integration. He contends that core curriculum is representative of a curriculum that uses social problems as cores in order to establish links among various content areas.[10] Plihal and colleagues also consider integration as one of the forms of core curriculum. They believe that core curriculum represents the organization of knowledge and learning around issues that have been identified.[11] Curriculum integration is a student-centered approach in which students and their teachers join together in order to develop learning experiences from the vantage point of students and regarding major social issues. The name "core curriculum" was given to this approach by researchers who developed it.[4] Educational experiences such as personal and social problems can be organized in an *integrative core curriculum*, with subject matter introduced only as it bears on a particular problem under study. The essential should be determined within the core.[9] This concept of the core curriculum is aimed at equipping medical students with chances to work together and with their fellows and teachers to apply and integrate subject matter in order to analyze common personal or social problems.[12] Integrated core curricula are more common and widespread in comparison to discipline-based curricula and have more benefits and advantages. These include (1) integrated core curriculums are problem-based and this fosters and nurtures higher levels of thinking; (2) research conducted on the human brain shows that in order to understand meanings and concepts, our brains explore to find maps and try to establish links among elements and learning components, and instructional design based on these links is thus logical and justifiable; and (3) curriculum design in this format helps to remove unnecessary duplicate content in different courses and finally refines the curriculum.[22]

In medical education, core curriculum, defined as "common learning experiences," is essential for medical students to achieve clinical competencies. The success of core curriculum depends on its determination and implementation. Therefore, it is concluded that in addition to

determining and developing curriculum content, training content, creating learning experiences and finding out how to obtain learning experiences is important.[23] Core curriculum can create precise and relevant learning opportunities for students.[24] In the core curriculum, common educational content should be considered as the core of curriculum rather than essential content, and teaching what is essential for students should be considered in the determination and development of common educational content (core of curriculum).[25] The current challenge for all medical schools is to recognize and assess core knowledge, skills and attitudes within an integrated curriculum.[26] Developing the integrated curriculum in core curriculum provides opportunities for application of active teaching strategies, meaningful learning and integration of conceptual knowledge and practical knowledge. One of the goals of core curriculum designing is to identify an essential "core of conceptual knowledge, practical knowledge and attitudes" in an integrated core curriculum.[27] Integration of basic and clinical knowledge and creating opportunities for acquiring clinical experiences help students have deep and meaningful learning.[23] An example of integration in the core curriculum can be seen, in a study conducted by Nicolette and Jacobs.[28] In this study, topics and content of women's health were integrated in core curriculum without an increase in curriculum content, and core curriculum was developed in integrated form. The aim of developing core curriculum in integrated form is that medical students consider the role of a patient's sex in history taking and the clinical teacher tries to lead the student.[28] Another study was conducted by Orsbon et al on the subject of integration in the core curriculum in anatomy at Chicago Medical School. In this study, the core curriculum development was done in the integrated design and the relationship between integration and core curriculum was well-represented. The curriculum in anatomy should prepare students to enter the clinical course in various specialties, and this study examined the core curriculum accountability to the prerequisites of anatomy knowledge for entry into the clinical course and vertical integration of basic science and clinical requirements.[29]

Discussion

As mentioned in the results, there is a potential possibility for overloading curriculum in medical education, therefore designing the integrated curriculum and core curriculum is essential.[30] The concept of core curriculum and integration are very closely linked, with some of the experts in the field of curriculum planning considering integration as one of the forms of designing core curriculum.[11] Curriculum integration creates a dynamic development in teaching and learning process. In the integrated curriculum learning to be considered as a whole.[31] Integrated curriculum is an effective approach to helping students develop connections between different topics.[31] The current challenge for all medical schools is to recognize and assess core knowledge, skills and attitudes within an integrated curriculum.[26] In the integrated core curriculum,

curriculum designing begins with identification of needs and problems of students; in the next step, core curriculum consists of core knowledge, attitudes and skills is determined and integrated in curriculum.[32] Developing the integrated curriculum in core curriculum provides opportunities for application of active teaching strategies, meaningful learning and integration of conceptual knowledge and practical knowledge.[27] The designing curriculum in integrated form is the contextualization of the core curriculum and making connections between core knowledge, attitudes and technical skills.[31] Designing the integrated core curriculum is important to ensure that the different components of the curriculum reinforce each other.[30]

Conclusion

The concept of core curriculum and integration are very closely linked, with some of the experts in the field of curriculum planning considering integration as one of the forms of designing core curriculum. Indeed, both concepts were developed in response to the overload of knowledge, the need to teach and learn basic and clinical sciences together and the need to create meaningful learning.

Accordingly, in order to achieve the appropriate knowledge and provide organized teaching in basic and clinical sciences to the learner in medical education, the appropriate methods for integrating curriculum and development of the core curriculum must be used.

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