COMMENTARY

Misconceptions: How To Diagnose And Clarify Them In Undergraduate Medical Students

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ABSTRACT:
A big challenge for medical educationists is to search for learning strategies that promote meaningful learning and discourage rote learning. Clinical expertise is achieved by acquiring large amounts of biomedical knowledge structured as concepts linked together in a loosely connected semantic network. Medical students using concepts maps can successfully retrieve information in the short term. Concept maps allow students to recognize the relationship between concepts, which reflects the kind of real-world thinking predominant in the clinical setting. Conceptual thinking occurs when a student goes beyond the surface structure of a problem and recognizes how the problem can be solved, and in addition, possesses the content knowledge integral to solve the problem. Without both components a student may not just be able to critically analyze one problem, but will also fail when given a similar problem in a different context. Hence, there is great need for identification of these learning difficulties mainly in the form of confusions, ambiguities and misconceptions in the learner's mind.

Keywords: Misconceptions, Meaningful learning, Concept map, Conceptual thinking, Undergraduate medical students

INTRODUCTION:

What are misconceptions?

These are deep rooted ideas that are not in harmony with the scientific truth and are very resistant to change. They arise due to lack of peer interaction, least participation in small group discussions and inadequate exchange of ideas in undergraduate medical students. This makes it difficult for the individual to register information in memory structures resulting in poor retrieval in real-settings[1, 2]. Conceptual learning is grounded on constructivist approach for teaching and learning. It greatly emphasizes that learners synthesize new knowledge, based on prior learning experiences and make judgments by modifying their existing knowledge[3]. There are great chances of false registration of knowledge creating confusion and perplexity in the learner`s mind[4].

Strategies to identify misconceptions:

Unveiling preconceptions is done by taking a detailed interview regarding any topic in which thought-provoking questions are asked. Subsequent questions are raised from the previous answer which would enable the student to think and express his views more efficiently[1,2]. If the learner is unable to answer a successive set of questions and realizes that he is unable to justify whatever he is saying, he surely bears a strong misconception somewhere in his mind[5]. Learners may also be told to construct a concept map as they reflect the organization of the pre-concept and reveals areas of weakness[6]. They also help in elaboration of their knowledge and use of meaningful patterns in relevant context. This technique would help in the identification of difficulties in reasoning. Defective concepts can also be determined by assigning tasks where the learners would surely not understand the challenge and end up writing a wrong answer due to lack of meaningful integration of knowledge. The inability to understand and attempt such exercises would clearly show that his personal models of reality are actually scientifically incorrect[7].

Besides the above mentioned techniques to reveal misconceptions, learners may be instructed to take word association tests. Such tests would allow students to write as many related words on a given topic in a specific time period. Use of structured communication grids would give teachers the opportunity to observe logical sequencing of the answers next to their respective question.

Creating a conceptual conflict: [1, 8]

Tutorial session and allowing students to defend their stance is an excellent approach to identify erroneous concepts. This is done through small group discussions[1] and carefully listening to the entire conversation during the class. Failure in providing scientific support to his statements and inability to justify himself in front of his peer group would reveal his misconceptions. Hesitation in performing a hands-on demonstration on a relevant topic may be an evidence for the learner's inability to provide scientific reasoning1.

Use of hypothetico-deductive reasoning models:

Indulging students in situations where they would carry out tasks and compare their work with peers is also one of the most astonishing strategies to reveal misconceptions[9]. Inability of students to relate meaningful information in relevant clinical contexts points towards the need of enabling students to actively engage in the problem solving process.

Clarification of misconceptions:

Once success has been achieved in determining the underlying reasons for such false concepts, it is the prime responsibility of teachers to help the students go through a complete restructuring of their knowledge[10].In order to reform their concepts, "Conceptual Change Strategies" should be applied[11].Students realize that their existing knowledge is not helping them solve any task, nor answer questions correctly and would end up in great dissatisfaction. They would also feel that the new knowledge is far more applicable in solving daily life problems and would be confident in explaining this new concept to his colleagues. They would better be able to use this new knowledge to fit in their mental models with a feeling of acceptability[12].Active engagement in cooperative learning would broaden their perspectives and

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clarify any misconception at hand by listening to their peers and generating discussions. There would be exchange of ideas which would probably enable students to rectify their misconceptions and improve their communication skills as well[13].Students must also be trained to be strategic and develop keen interest in the subject. This would happen if they adopt a step-by-step approach towards accepting information that is based on scientific evidence. For meaningful learning to occur, they would need to grasp scientific knowledge and understand theories based on evidence.

Since medical students are exposed to loads of new experiences in daily life which they use to construct new ideas, they need meta cognitive self- questioning from time to time. This is because once students develop a habit of being aware of their strengths and weaknesses in the journey of struggling for the correct concept; they would surely excel in attaining plausible and believable ideas[7,14]. Increase elaboration and evaluation of ideas greatly benefits learners. Concept maps not only reveal misconceptions but play a major role in correcting them. By advising students to construct concept maps, teachers enable them to build connections of prior knowledge and the new content resulting in better retrieval[4]. Moreover if students want to develop a clear concept, they must also get actively engaged in discussions with incorporation of concept maps.[6,7] This surely would be the best strategy to remove any misconception in mind[8].

Students need to understand the essential characteristics of scientific theories. Since students are heading towards becoming an expert, firstly they need to understand each and every detail of the subject[9]. They must spend a lot of quality time paying attention, to read text and learn to analyze evidences that support or negate a hypothesis. They must learn to fill the gap between theory and evidence by comparing and contrasting various propositions in a scientific text[15]. Reflective thinking may enable novices to look into themselves and identify their weaknesses. To become an adept professional the undergraduate medical students must have clear concepts in mind. This would be achievable once they develop a habit of pondering over their performance and judge their competencies by themselves[16]. Once they are able to critically analyze their poor performance, they would clearly see faulty knowledge structures in their mind and realize the need for concept maps, conceptual change and critical thinking.

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