

# Chapter 9

## Teaching Critical Thinking to First-Year Medical Students through Concept Mapping

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### EXECUTIVE SUMMARY

*Helping students learn the basic sciences and demonstrating their importance in the practice of medicine presents a challenge for the majority of medical science educators. A curriculum change of medical biochemistry was implemented to include concept mapping as a visual strategy to enhance the analytical and critical thinking skills during clinical case-based workshops. A rubric was used to give detailed feedback and provide guidance to students. A number of clinical cases were judiciously selected to illustrate specific topics. Students meet with a faculty member to discuss the concept map prior to the workshop. During such meetings, all members are asked to participate in explaining their reasoning and decision-making and to thereby justify the flow of the concept map. This activity gives students the opportunity to demonstrate their capacity to visualize their knowledge using the concept map construction.*

## **INTRODUCTION**

Teaching basic sciences in medical school can be challenging because some concepts are not easily connected to the practice of medicine and because formative assessments are not made central to learning. One of the major difficulties for a basic science educator is to make the connection between the sciences taught and their relevance to the functioning of the human body in health and disease. Students frequently perceive basic science as useful only for passing exams and allowing them to move into their clinical years. A recent study by the National Board of Medical Examiners demonstrated that by the STEP 2 clinical exam, students shed a significant portion of their basic science knowledge, including medical biochemistry (Haist, Swanson, Holtzman, & Grande, 2010). This trend is alarming, especially because basic sciences provide the foundation for one of the core competencies of a physician: practicing evidence-based medicine (Bierer, Dannefer, Taylor, Hall, & Hull, 2008). Research in cognitive psychology has shown that retention of basic science knowledge is dramatically improved when the connections between biomedical science and its clinical relevance are made (Woods, 2007; Woods, Brooks, & Norman, 2007a, 2007b). Consequently, it is the medical educator's responsibility to make these connections for learners early on in order to engage them in doing more than just memorizing and practicing pattern recognition.

The formative and summative evaluations of our students over the first five years have left us with a sense of urgency for changing our existing teaching methods. A needs assessment was conducted to discover the students' perception of the current learning environment. It assisted us in shaping the new curriculum by engaging students who otherwise would not have expressed their needs, either because (a) they lacked motivation to learn, (b) they might not have wanted to be identified as lacking knowledge, or (c) they were simply not given the opportunity to express their needs in the past.

This chapter describes the steps that have been taken to shift from an exclusively lecture-based biochemistry curriculum to a more scenario-based curriculum that incorporates team-based workshops of clinical cases where concept mapping was used as a means to visualize knowledge and make logical connections between biochemical concepts and the expression of a disease.

## **CONCEPT MAPPING A POWERFUL TOOL FOR TEACHING CRITICAL THINKING**

The goal of using concept mapping as a teaching tool is to demonstrate to students that there is a way to visualize knowledge and to think critically through a medical

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