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Teaching Innovations

I find that students in undergraduate and graduate Pathophysiology courses often struggle with the amount of material in the course. These classes can be extremely large lecture-hall style classes, which tend to be very impersonal for the students. A class of nursing students is often quite diverse with regards to prior academic and real-life experiences. To create a more active learning environment for such a large and diverse course, I have developed a strategy to be implemented in my next course.

My strategy is a simple and common strategy, in-lecture clicker questions, that I believe will enhance and solidify student learning. Previously I have used clicker questions as a way to test class knowledge and an opportunity to explain why the correct answer is right and the other answers are wrong. However, I would like to incorporate peer feedback and case studies into the clicker questions.

My strategy has 3 parts:

- A few (2-3) straightforward clicker questions at the beginning of lecture to review previous material or basic physiology. (2-3 minutes)
- A couple (1-3 depending on difficulty) clicker questions of varying levels to reinforce current material in the lecture (3 minutes)
- A case study or integrative/application clicker question for students to discuss and answer with a neighbor (5-10 minutes)

I think this 10-15 minutes of class time would be well spent. It also can function to break up lecture and re-focus concentration. Even the best and brightest students lecture fatigue.

Implementation:

1. Prior Knowledge. All students will have completed the same pre-requisites prior to entering the nursing program, so they should have been exposed to the same core material from their biology, chemistry, and physiology classes necessary to learn the material in a pathophysiology course. But, not all students enter with the same level of prior knowledge from these courses. Students also enter the course with different experiences, such as a prior biology degree or EMT training.

The review clicker questions at the beginning of class are a way to address prior knowledge. These questions can review key concepts from a prior lecture in the class or function as a review of fundamental physiology concepts necessary to understand the day's lecture. These questions can provide a mechanism for students to check their own understanding, a gauge of the classes' grasp of course content, and an opportunity to fix any misconceptions students have from prior material. These review clicker questions will provide an opportunity for students to activate their prior knowledge or identify gaps in their prior knowledge at an early stage in the material.

Although these questions should not take up more than 2 or 3 minutes of class time, students would be directed to where they could find the material in a previous lecture or textbook. Students would be encouraged to review the material to address the knowledge gap or to see me or a TA during office hours (or make an appointment).

2. Organize Knowledge. Pathophysiology covers a lot of material, and many students find they have a lot to memorize. However, a student must be able to apply and integrate the knowledge in order to pass this and all subsequent nursing school courses. Since everything in the body is interrelated, students must be able to organize their knowledge in such a way that the individual topics and systems (endocrine, neuro, cardiovascular, etc.) do not stand alone but rather can interact with one another.

To address this, the peer-interactive case studies will provide students with an integrative problem in which they will have to re-organize their linear topic-based knowledge into a more robust knowledge

organization. By working in small groups of 2-4, students are exposed to the thought processes of other students. These interactions are a way for students to develop new knowledge connections by seeing how their peers think about the problem. Further, by requiring students to incorporate multiple concepts and topics in answering the case study questions, students will see new connections among their previously learned knowledge.

3. Iterative Practice and Feedback. The in-lecture clicker questions provide not just a break in the lecture but also immediate feedback for students to check their learning and understanding of the current material. These questions provide immediate feedback for me as an instructor to see if I need to explain a topic in a different way, while also providing students with some practice using the new material. The review questions at the beginning of class provides iterative practice of key concepts from prior material. Further, the case study questions will incorporate material from the current lecture/topic and prior material as a way to integrate the course as a whole concept. This exercise will require students to check their understanding of prior material and apply it to a complex problem, serving as another mechanism for iterative practice and feedback of knowledge application.

4. Affective Domain. The clicker questions provide an opportunity for students to test their knowledge relatively anonymously. One strategy to motivate student engagement in the process is to incorporate course points into the questions. For example, getting a set number of questions correctly could count towards a couple of extra credit points on an upcoming exam or count as a quiz grade. These points should be an incentive and not an additional stressor in the course.

The small group case studies are an excellent tool for fostering interdependence among students. Students are given an opportunity to work together on a complex problem and provide input based on their understanding of the material. Unlike working on group projects which often result in one grade based on group performance, this brief group interaction provides an opportunity for students to work with one another without the stress of depending on the group for a grade. Not only will this activity promote learning through complex knowledge organization and iterative practice, but it will also foster group communication skills and hopefully a sense of community among the students.

Overall, this strategy will be a great way to break up the lecture, review material, enhance learning, and foster a sense of community just by coming up with a few questions to incorporate in each class. And I'm just sneaky enough to use a few of the questions verbatim on an exam as a way to see if anyone is paying attention!