Medical Physiology and Experimentation: Reconsidering the Undergraduate Examination Structure

The structure of the examination procedure is indicative of the teaching goals set by the tutors, because it focuses on the (so thought to be) “essential parts” of the provided knowledge. When there is a clear view of what one wants the students to know, a well-designed examination system can be established to evaluate this learning outcome. Vice versa, a clear view of what the examiners are likely to ask makes the students more active and careful during the teaching of the so-called “essentials” (1). However, recently, there has been a typical (one might use the term “disdained”) approach toward experimental demonstrations as part of biological, physiological, and allied health biochemical education. Experimental demonstrations have become a rare, nonpopular sometimes, event. Medical students believe that experimental demonstrations (where attendance is not voluntary) 1) are (in their majority) not well designed or instructed (and thus considered to be “boring”), 2) are not a task of evaluation (and thus are not considered as “essential”), 3) do not provide knowledge in an innovative way (because some of the experimental apparatus and demonstration material have remained unchanged for more than 20 yr), and 4) do not cope with public concerns of animal use for teaching. Moreover, one should consider that most of these students are under increasingly strong pressure to cope with the dreaded “licensure exams,” a fact that makes secondary activities (such as laboratory demonstrations) a meaningless procedure.

We, herein, provide a short view of how we think the undergraduate evaluation of medical physiology should be to enhance a more active participation of the students in the small-group experimentation lectures taking place during the teaching of medical physiology. Primarily, we believe that the teaching of medical physiology should take place in three semesters: the second, third, and fourth [the undergraduate medical program at the Medical School of Athens (University of Athens, Athens, Greece) is a 6-yr academic program in which medical physiology is examined by the end of the third and fourth semester]. The teaching should be done in the following blocks: 1) block I (second semester: essential aspects, neuromuscular system, autonomic nervous system, endocrine system, and immune system); 2) block II (third semester: cardiovascular system, respiratory system, renal system, temperature regulation, and gastrointestinal system); and 3) block III (fourth semester: intermediate metabolism and growth, central nervous system, sensory systems, higher functions, and reproductive systems).

As educators, we are continually designing new methods and procedures to enhance learning. During this process, good ideas are frequently generated and tested, but the extent of such activities may not be adequate for a full manuscript. Nonetheless, the ideas may be quite beneficial in improving the teaching and learning of physiology. Illuminations is a column designed to facilitate the sharing of these ideas (illuminations). The format of the submissions is quite simple: a succinct description of about one or two double-spaced pages (less title and authorship) of something you have used for the classroom, teaching, laboratory, conference room, etc. You may include one or two simple figures or references. Submit ideas for inclusion in Illuminations directly to the Associate Editor in charge, Stephen DiCarlo (sdicarlo@med.wayne.edu).

Table 1. Proposed examination structure to introduce the evaluation of the experimental demonstration learning

<table>
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<tr>
<th>Type of Questions</th>
<th>Points</th>
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<tr>
<td>Part A</td>
<td>Twenty-five multiple-choice questions</td>
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<tr>
<td>Part B</td>
<td>Five questions consisting of multiple choice and an extra related short-answer request (2–3 sentences long)</td>
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<tr>
<td>Part C</td>
<td>Three main questions (5–8 sentences long)</td>
</tr>
<tr>
<td>Part D</td>
<td>Five questions (not to exceed 10 sentences in length) concerning one of the experimental demonstrations that took place during the passing semester</td>
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The evaluation of each block should take place right after the end of each semester, through written examinations. We propose that the examination should consist of four parts (Table 1).

In the first part (part A), all 5 topics analyzed in each block should be examined via 25 (total) multiple-choice questions. Each correct answer should be rewarded with 1 point (with a maximum of 25 points for this part). In the second part (part B), each of the five topics analyzed in the past semester should be examined by a representative question (total of 5 questions). The latter should be a multiple-choice question followed by a short-answer request (~2–3 sentences long; a limited provided space in the answer sheet would be helpful). Each correct multiple-choice answer should be rewarded with 1 point, whereas each correct short answer should be rewarded with 1–4 points (with a maximum of 25 points for this part). The third part (part C) should consist of 3 main questions (randomly selected among questions provided by tutors and concerning the 5 examined topics of the current block). Each answer (not >5–8 sentences long) should be rewarded with a maximum of 10 points (with a maximum of 30 points for this part).

Finally, we believe that the fourth part (part D) should provide five questions concerning one of the experimental demonstrations that took place during the passing semester. Each answer (expected not to exceed 10 sentences in length) should be rewarded with 1–4 points (with a maximum of 20 points for this part). Through part D, students should be encouraged to provide clear and comprehensive answers, a fact that can be established through the examiners’ request.

By examining the experimental demonstration learning of medical students, we will force them to be more active during these teaching sessions and provide them with a better thinking of collecting, analyzing, and evaluating experimental data by
simultaneously reviewing the major ideas of physiology (as presented in the ordinary lectures) (2). However, before we proceed to such a measure, the faculty members should 1) redesign the demonstrations’ structure to provoke more active student participation; 2) renew the experimental apparatus and demonstration material; and 3) be more selective as to what is essential to demonstrate during these experimental classes, with a clear view of what has been mentioned during the ordinary lectures and how it was discussed.

REFERENCES

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doi:10.1152/advan.00078.2005

The Blanket Method: a Novel Method of Teaching Peritoneal Relations of Female Reproductive Organs

Understanding the peritoneal relationship of organs in the abdomen and pelvis is essential for medical students. Teaching peritoneal relations in a lecture is challenging, and often at the end of a lecture, we hear comments indicating that the students did not understand the lecture well.

Here, an innovative method of teaching the peritoneal relations of female reproductive organs is described. The teacher used a blanket and three students as the peritoneum and reproductive organs during a lecture class to explain the peritoneal relations of female reproductive organs.

I presented a traditional lecture of the female reproductive system using a PowerPoint presentation and a didactic lecture. I first described the anatomy and positional relationships of the uterus, fallopian (uterine) tubes, vagina, and ovaries. When I came to explanations of the peritoneal relations of these organs, I could see some blank looks in the class. I asked the class if they need any other type of instruction to make them understand the peritoneal relations. They immediately said “yes.” I asked them to bring a big blanket for the next lecture class. During the next lecture class, I called three volunteers from the class to the lecture platform. At first, one of the volunteers was asked to stand with outstretched hands. The head of the volunteer was compared to the fundus of the uterus, the lower limbs to the vagina, and the upper limbs to the fallopian tubes. The second student stood in front of the first and portrayed the urinary bladder. The third student stood behind the other two and portrayed the rectum. Finally, a blanket was spread on all three students to demonstrate the peritoneal relations of these organs.

The big double-layer fold of blanket hanging below the outstretched hands of the middle student was compared with the broad ligament. A chalk box (representing the ovary) was then passed between the two layers of this fold and was pushed posteriorly through the posterior part of this broad ligament to show how the mesovarium was formed. The entry of ovarian vessels and uterine vessels into the broad ligament was also demonstrated effectively. The volunteer who represented the female reproductive tract was asked to bend forward to show the anatomic anteverted position of the uterus. The straightening of the uterus as the bladder fills was also demonstrated. The positions of the rectouterine pouch, uterovesical pouch, and relations between the ovary and rectum were also demonstrated.

The students said it was easy to remember the peritoneal relations with such simple comparisons. Some of the specific comments were “It was easy to understand the topic,”