

Exploring of Exercise Physiology Course Reform

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Abstract: With the national strategy of "Health China", the concepts of "exercise is good medicine" and "integration of physical medicine" have been deeply rooted in people's hearts. Exercise physiology, as one of the health-related disciplines in sports science, must be transformed from a professional basic course to an applied basic course, so as to cultivate more professional talents who can master the professional knowledge of sports and health and guide people's fitness. At present, few class hours and poor cultural foundation of students are the main obstacles to teaching exercise physiology. Based on this, we have carried out several curriculum reforms and have achieved a more satisfactory teaching effect. In this paper, we summarize the process of teaching reform, especially the experience of establishing the online course, to provide references for other teachers to teach exercise physiology.

1. Introduction

Exercise physiology is a core course for all related majors in sports science, it has an important guiding role for students to engage in physical education. Exercise physiology was positioned as a professional foundation course, and the teaching objectives were set at 2 levels: level 1, students could master the individual knowledge points of each chapter and understand the physiological characteristics of human organ systems and the changes in the exercise process. In the final examination of the subject, about 80 points of the questions are based on individual knowledge points, and students can finish the course with 60% corrects; Level 2, students can master the correlation between various knowledge points, understand the human body's movement process as a whole, and can use the knowledge of exercise physiology to solve practical problems. In the final examination of the subject, such questions account for about 20 points.

However, in recent years, more and more attentions have been paid to public health. The State Council has also issued relevant documents, such as the "Health China 2030" Plan, indicating that improving people's health is an important direction for the development of the country nowadays. In this context, sports have received more focus as an effective means of preventing and treating chronic diseases. The concepts of "exercise is good medicine" and "combination of exercise and medicine" are becoming more and more popular. Exercise physiology, as one of the health-related disciplines in sports science, has been given a higher mission. Making more students reach Level 2 is the only way that meet the demand for sports talents in "Healthy China". However, most of the physical education students have a relatively weak cultural foundation, and the class time of exercise physiology is short, so only about 10% of the students can reach Level 2 in the past years. Therefore, how to make the majority of students reach Level 2 is a problem that needs to be solved urgently in the teaching of exercise physiology.

2. Teaching Reform Exploration Process

Firstly, the orientation of the course needs to be changed from the original professional basic course to the applied basic course. The content of the exercise physical can be divided into basic part and application part. In the past, when exercise physiology was located in the professional

basic course, it was only necessary to teach clearly about the knowledge points in the order of chapters, and the basic part and the application part were two parallel parts without too much crossover. However, in the new situation, it is necessary to change the orientation of exercise physiology into an applied basic course, and from the current demand of talents, the applied part is the focus, while the basic part is the difficulty and should serve the applied part [1]. The use of knowledge points is clearly explained when talking about the basic part, and the theoretical basis is clearly explained when talking about the applied part. Therefore, we have carried out the following three teaching reforms successively.

2.1 Reform 1: Redistribution of Class Hours

It is the simplest and most direct way to reduce the basic part of class time and increase the application part of class time, but the students can't go deeper when teaching the application part. When students face a specific case, they lack independent thinking ability, so teachers have to explain the basic part related knowledge points again, which wastes more time.

2.2 Reform 2: Group Teaching and Flipped Classroom

This is the model adopted by many universities [2, 3]. The main ideas are divided into the following steps: (1) according to students' learning level, especially students with liberal arts background need to be grouped evenly, and strive for 1-2 students with better learning to lead each group; (2) the content of the textbook is integrated, breaking the boundary between the basic part and the application part; (3) The problems are distributed to each group of students before the class, students should explain the problem solving methods and related exercise physiology knowledge points during class; (4) The teacher summarizes and supplements according to the students' explanation. This method was much more effective than Reform 1. However, the exposed problem is that the students' ability to diagnose the exerciser's physical function is insufficient, so it is difficult to produce targeted exercise prescriptions. The root cause of this problem still lies in the fact that students do not have a systematic grasp of the basic part of the knowledge points. Therefore, we found out the importance of the basic knowledge, and we believe that learning the basic part is the key factor to make students reach level 2.

The main difficulties in learning the basic part are concentrated in 2 aspects: (1) many specialized terms. They need to spend a lot of time to memorize and understand the meaning of these terms. (2) Too few class hours. At present, many colleges and universities have about 60 class hours, including a part of the laboratory class.

2.3 Reform 3: Online Course + Group Teaching + Flipped Topics

Online courses are currently a common teaching method [4-10]. The following issues need to be considered: (1) The positioning of online courses. Are online courses mainly used for supplementary teaching? Which part of teaching does it mainly play a role? Pre-learning, teaching process or review? (2) The form of content presentation. The existing high-quality online courses are mostly presented in the form of text + video. For exercise physiology, it is most important for students to master the overall knowledge framework. What role should the text part and the video part play respectively? (3) The depth of content presentation. If the presentation is too professional, it is difficult for students to accept; if the presentation is too simple, it is no different from directly sending knowledge points to students.

3. Suggestions for the Construction of Online Courses

In view of the positioning of the online course, the effect of the online course alone should not be as good as offline teaching, so we position the online course for supporting teaching. Its role is to provide students with materials and guidance of ideas through pre-course pre-study and post-course review. The teacher will combine specific cases in class to focus on the shortcomings of students' pre-study. There are only 2 points that need to be done in the online class: (1) the relevant knowledge points are clearly explained; (2) the knowledge points are linked into a completed

physiological event. The second point is the focus. For example, in the section on the principles of muscle contraction, the book is divided into 2 parts to explain the microstructure of muscles and the process of muscle contraction and diastole, in which the terminology includes myogenic fibers, myoblasts, bright bands, dark bands, H-bands, troponin, proto-myosin, actin, etc. Students first need to understand these terms and memorize the structure of these proteins before they can know how they are put together and realize the process of muscle contraction. Most students only know that myosin is the basic unit of muscle contraction, but very few of them understand how myosin contraction is the process of muscle contraction to make specific sports skills. Therefore, we combine anatomy, starting with the main muscle groups needed in the bending elbow action, and then explain the logical relationship with skeletal muscle - muscle belly - muscle bundle - muscle fiber - myogenic fiber - muscle tubercle. The students were then guided to think about the relevant knowledge points used in the whole process from stimulus to response, and new knowledge points were added as the course progressed. We find that students have a much deeper understanding and a better foundation for the application part.

At present, the format of the online course is text + video lectures, with the text part being mostly a display of knowledge points and the video part being a teacher's explanation. In view of the difficulty of learning exercise physiology, it would be better if the logical relationship between the knowledge points could be presented in the text part; the video part presents 2 parts: 1, presenting microscopic physiological processes, such as my filament gliding process, neurotransmitter release process, etc., to help students understand more intuitively; 2, presenting macroscopic physiological processes. Such as the respiratory process, showing the respiratory muscles and auxiliary respiratory muscles involved in the exhalation process and inspiration process, the change process of thorax and abdominal cavity, etc. The knowledge points of thoracic respiration, abdominal respiration, lung volume and pulmonary ventilation are built into a knowledge system through the video, so that students can further understand the logical relationship between the knowledge points. In class, we ask students to recall how their breathing changes when they exercise, as the exercise time increases or the intensity increases. Students were prompted to think in terms of lung ventilation, respiratory rate and depth of breathing. Students then discuss in groups and select representatives to answer in turn. Based on the students' answers, the teacher identifies weak points of knowledge and focuses on them.

Regarding the depth of the content, considering that the class is mainly used to support teaching, students need to learn independently in the process of pre-reading and review, so the content should be presented as common as possible to facilitate students' understanding. For example, the whole book is based on the main line of "homeostasis", with the bending elbow action as an example throughout the book, and then exercise as a stimulus, from the maintenance of homeostasis, changes in homeostasis during and after stimulation as the starting point, to explain each chapter, so that students can establish a complete knowledge system of exercise physiology, for further study of the application part to lay a good foundation. This will enable students to build up a complete knowledge system of exercise physiology and lay a good foundation for further study of the application part.

4. Summary and Prospect

After 2 rounds of piloting the online course, 60% of the students can now reach level 2. However, this online course currently relies too much on teacher classroom instruction, and it is difficult for students to build a more complete body of exercise physiology knowledge through online classes alone. In the future, we will record a 10-minute video for each chapter online to explain the relationship between the knowledge points in this chapter to further help students deepen their understanding.

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