

A Preliminary Study on the Teaching Reform of Biological Instrument Analysis Course

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Abstract: The teaching of biological instrument analysis plays a key role in the development of modern life science field. With the deepening of life science research, new instrumental analysis techniques and methods continue to emerge. These technologies have been widely used in the fields of biology, clinical diagnosis, medicine, materials and so on with their rapidity, accuracy, good selectivity and high sensitivity. As the core component of biology teaching system, the course of biological instrument analysis is very important for cultivating students' experimental and theoretical knowledge and scientific research ability. However, with the emergence of new testing methods and testing instruments, the course of biological instrument analysis is faced with many challenges, including lagging teaching content, single teaching method and insufficient cultivation of students' practical ability, which directly affect the teaching effect and the improvement of students' comprehensive quality. In view of this, this paper makes an in-depth analysis of the main problems existing in the current teaching of biological instrument analysis, and puts forward targeted improvement strategies, aiming to effectively improve the teaching effect of biological instrument analysis experiment by optimizing the course system, innovating teaching methods, strengthening practical operation and other means, and cultivate more innovative application talents with solid theoretical foundation and practical ability. In order to meet the needs of social and scientific and technological development.

Keywords: Biological instrument analysis; Experimental teaching; Teaching reform

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1. Introduction:

The teaching of biological instrument analysis plays a vital role in modern production and scientific research. It not only provides an effective means for the acquisition of material information, but also acts as a comprehensive and professional analysis and testing method, involving many subject areas, such as biology, chemistry, physics, mathematics and computer science and technology^[1-2]. The cross-fusion between these disciplines makes the teaching of biological instrument analysis extensive in content, strong in theory, and the knowledge permeates

and influences each other^[3-4].

As a practical course, the teaching content of the biological instrument analysis experiment course is divided into two parts: classroom theory teaching and field experiment teaching. As an extension of theoretical teaching, experimental teaching plays an irreplaceable role in cultivating application-oriented talents^[5-6]. Under the background of China's education reform, the focus is on cultivating students' practical ability and innovation ability, aiming at cultivating innovative talents who can adapt to the needs of society^[7-9].

The experimental course of biological instrument analysis, as an extension of classroom theoretical teaching, aims to enable students to master the methods of independent scientific experiments through practical teaching, develop good experimental habits, and improve students' ability of judgment, reasoning, observation and thinking^[10-11]. However, in the current biology teaching experiment, there are still a series of problems in the application of instrumental analysis, such as outdated teaching content, a single teaching method, insufficient opportunities for students to practice, etc. These problems seriously restrict the improvement of teaching quality and the cultivation of students' ability^[12-16]. Therefore, this paper aims to explore the problems existing in the teaching of biological instrument analysis, and put forward corresponding countermeasures to reform the experimental teaching methods, enrich the experimental teaching methods, lay a good foundation for the follow-up study and practice of students, and contribute to the cultivation of innovative application talents.

2. Problems existing in the teaching of biological instrument analysis

2.1. The teaching content is complicated and outdated

The teaching content of a biological instrument analysis course involves many complicated instrumental analysis theories and techniques, and some content may not be updated in time, which makes it difficult for students to digest and absorb. In addition, the old teaching content is also difficult to stimulate students' interest in learning, affecting the overall teaching effect. This not only increases the difficulty of students' learning, but also limits their understanding and mastery of the latest instrumental analysis technology.

2.2. The experimental conditions are limited and the teaching effect is not good

In the actual experimental teaching of biological instrument analysis, due to the limitations of experimental conditions, such as an insufficient number of instruments, obsolete instruments and equipment, and a shortage of experimental materials, students cannot fully carry out practical operations, affecting the effect of experimental teaching. Experimental teaching is an important part of the course of biological instrument analysis. Poor experimental teaching results will lead to students' lack of understanding and application ability of theoretical knowledge.

2.3. Students' basic knowledge is weak and their learning enthusiasm is not high

When students learn the course of biological instrument analysis, due to the lack of solid basic knowledge in the early stage and insufficient background knowledge, such as physics, chemistry and other relevant basic knowledge, it will lead to many difficulties in the learning process, which greatly affects the enthusiasm of students. In addition, due to the boring teaching content and methods, the learning motivation of students is further weakened, and the low enthusiasm of students will further affect the overall teaching effect and reduce the learning outcome of students.

2.4. Disconnection between theory and practice, single assessment method

In the teaching of a biological instrument analysis course, the disconnection between theory and practice is a common problem. Students learn a lot of theoretical knowledge in the classroom, but it is often difficult to combine the learned knowledge with practical operation in the actual experiment. In addition, the assessment method is often too simple, mainly relying on written tests or the writing of experiment reports, which may lead students to pay more attention to the memorization of theoretical knowledge and neglect the cultivation of practical ability.

3. Biological instrument analysis of teaching reform countermeasures

3.1. Clarify the main line of knowledge and grasp the key points of teaching

The teaching reform of the course of biological instrument analysis should start with clarifying the main line of knowledge, clarifying the teaching focus, and ensuring that students can systematically master the core knowledge and skills. It is necessary to deeply analyze the course content, systematically integrate complex theoretical knowledge, highlight key knowledge points, and help students establish a clear knowledge framework. At the same time, we should pay attention to the combination of theory and practice, and stimulate students' interest in learning and improve teaching effect through case teaching and problem-oriented teaching.

3.2. Optimize the structure and content of the course according to the frontier of scientific research

The biological instrument analysis technology is constantly updated and developed, and the teaching reform should be combined with the trends of scientific research frontiers, and constantly expand and update the course content, so that students can timely understand the latest instrumental analysis technology and application. The practicability and prospectivity of the course can be increased by introducing the latest scientific research achievements and technological trends. In addition, experts in related fields can be invited to give lectures to share the latest research progress and technology applications and broaden students' academic horizons.

3.3. Reform the experimental teaching model and strengthen the combination of theory and practice

Experimental teaching is an important part of the course of biological instrument analysis. In the experiment teaching, we should reform the traditional experiment teaching mode and realize the organic combination of theory teaching and experiment teaching. Through the design of targeted and practical experimental projects, students can deeply understand the theoretical knowledge in the process of hands-on practice, and promote the cultivation of students' practical and innovative abilities. At the same time, the experimental teaching should be oriented to the actual needs of society, optimize the experimental content, and increase the practicality and application of the experiment.

3.4. Experimental teaching content should be set by classification, and experimental teaching classrooms should be designed by project level

According to different backgrounds and needs of students, experimental teaching content can be classified to achieve personalized teaching. The experimental teaching classroom is designed with project-based grading, and the experimental content is divided into basic, comprehensive, innovative, and other levels, so as to gradually

improve students' practical ability and innovative ability. In addition, students can be encouraged to participate in scientific research projects to cultivate their scientific research literacy and teamwork ability.

3.5. Innovate teaching methods and means to improve teaching effect

To improve the teaching effect, teaching plans should be written reasonably, and a variety of teaching methods and means should be adopted. We can use a project-type graded experimental teaching class to stimulate students' learning interest and initiative through group cooperation and a project-driven approach. At the same time, we should make full use of modern information technology means, such as virtual simulation experiments, online teaching platforms, etc., to provide students with more abundant and convenient learning resources and environment.

3.6. The teaching team should cooperate to implement experimental teaching practice

Establish a professional teaching team to realize the collaborative division of labor among teachers and jointly participate in the experimental teaching practice. Through teamwork, the efficiency and quality of experimental teaching can be improved to provide students with a better learning experience. Teaching team members can exchange teaching experience with each other, jointly discuss the improvement of teaching methods and experimental techniques, and constantly improve the teaching level.

3.7. Multi-level construction of teaching resource platform

According to the different needs of students, the teaching resource platform shall be constructed in different layers to provide rich and diverse teaching resources, such as online courses, experimental instructions, and scientific research papers. Through the establishment of the teaching resource platform, it can meet the needs of students' independent learning and improve the learning effect. In addition, teachers can also make use of the teaching resource platform to conduct teaching research and academic exchanges, and promote their professional development.

3.8. Build a diversified assessment system to comprehensively assess students' abilities

In terms of assessment, a diversified assessment system should be built, including comprehensive experimental teaching reform that combines process assessment and target assessment. Students' knowledge mastery, practical ability, and teamwork ability are comprehensively assessed through regular test reports, classroom performance, group discussion, and other forms of assessment. At the same time, mechanisms such as peer review and student mutual evaluation can be introduced to increase the fairness and objectivity of assessment. Such an assessment system can not only more accurately reflect students' learning outcomes, but also promote their comprehensive development. The comprehensive assessment method can evaluate the learning effect of students more comprehensively and promote the comprehensive development of students. According to students' performance and feedback, teachers can adjust teaching strategies in time to improve teaching quality.

4. Conclusion

The implementation of the teaching reform of the biological instrument analysis course can improve the teaching quality and students' learning effect more effectively, and enhance students' practical and innovation abilities. By optimizing the course content, innovating the teaching method, and strengthening the experimental teaching,

the students not only master the solid theoretical knowledge, but also can flexibly apply it in practice to solve practical problems. To sum up, we will continue to deepen the teaching reform, explore more efficient teaching methods, strengthen the cross-integration with other disciplines, and further improve the comprehensive quality of students. At the same time, we will continue to pay attention to industry trends, ensure that the teaching content is updated with the era, and contribute to the cultivation of biological science talents with an international vision and competitiveness.

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