

Exploration of Small Paper Reform Based on Experimental Report

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Abstract—Biotechnology and Pharmaceutical are two specialties to train biological professionals with strong specialty and practicality. Microbiology is the basis of the two major professional courses, and microbiology experiment teaching is an important part of the cultivation of practical ability. Based on the experiment report concerning cultural reform, this study has carried out the exploratory discussion from writing format and content, and cultivated the independent thinking and scientific thinking capability of undergraduates.

Keywords—Biopharmaceutical; Microbiology; experiment; experiment report

I. INTRODUCTION

The Biotechnology and Pharmaceutical professions are dedicated to cultivating medical-related professional applications and scientific research talents. Classroom teaching is a key part of the training process, and experimental class teaching is an important step in the completion of the combination of theory and practice. The traditional undergraduate experimental design is mainly based on the confirmatory experiments [1]. Although students could deepen their grasp of theoretical knowledge in learning, they could also achieve the purpose of improving practical operation skills through teaching [2,3]. However, there are still some improvement in cultivating students' scientific research thinking and standardizing their whole scientific research process. Microbiology, a compulsory course for the biopharmaceuticals, is a highly applied course. In microbiology experiment teaching, it is very important for the preparation of graduation thesis design, as well as for the post and future scientific research work [4,5]. Therefore, how to cultivate students' scientific research ability in microbiology experiment teaching is a direction worth exploring.

Most of the reforms in experimental teaching focus on the reforms of experimental content, experimental methods and teaching means. In fact, we often overlook an important point in experimental teaching-the experimental report [6]. The experimental report is the display and summary of the experimental results, which could directly reflect the students' understanding of the whole experiment, the manipulation of the experimental process, the description of the experimental results and the abilities to solve problem in experiment emerged [7]. Therefore, focusing on experimental reports, scientific research and feedback could effectively cultivate

students' comprehensive ability in experimental teaching and lay the foundation for follow-up learning. Microbiology experiment as an important practical operation training process, this study will explore the small paper model of the experimental report, in which the experimental report link should strengthen management, reform and innovation, thus improving the teaching effect of experimental teaching [8,9].

II. ANALYSIS OF PROBLEMS IN MICROBIOLOGY EXPERIMENT REPORTS

A. Immobilization of Report Form

The experimental report directly reflects the experimental process and the experimental results, but the traditional experimental report forms an immobilized format, which generally covers the experimental purpose, experimental principle, experimental equipment, experimental process and experimental results. This kind of modeled report is monotonously repeated in form. Students only repeat the whole process mechanically in writing, and even directly copy the teacher's handouts or classmates' reports, which limits students' innovative thinking and fails to cultivate students' subjective initiative.

B. Formalization of Experimental Report Content

The experimental report mainly focus on the enrichment and integrity of the content, which reflects the understanding and operational skills in the experiment. Under normal circumstances, for example, the confirmatory experiment of microbiology experiments is more biased towards repetition and results in the understanding of many students, thus ignoring the content itself. Meaning, the contents of the experimental report is simple and redundant in the writing. The writing of the operational skills is also in the form. It does not reflect the individuality in the content, but it is the same. According to the text, the content of the experimental report is too serious, but the students are instead Ignoring the focus of the experiment should be on the understanding of the process and the individualized understanding of the skills, rather than just focusing on whether the results are as expected.

C. Simplification of Experimental Report Results and Analysis

There are not only confirmatory results and experimental results with strong operability in microbial experiments, but also comprehensive experimental results. Students often overlook whether the results are consistent with the design, thus ignoring the meaning behind the experimental results and the significance of the results analysis. Problems and improvements in the experimental results are seldom shown in the experimental report, and may even cause some students to falsify the experimental report. The analysis and understanding of the results in the experimental report should be a sublimation process of the experimental course, which could exercise students' independent thinking and innovative thinking ability. Therefore, the results of the experimental report and the writing of the analysis are an important means to exercise students' practical and thinking ability while the ordinary experimental report has certain drawbacks in this respect.

In summary, we can see that the experimental report under normal circumstances, although we believe that the process from the form to the content covers the entire experimental and reflects the students' practical ability to operate. However, it also limits the students' active thinking and fails to better develop their comprehensive abilities. Therefore, we have explored the improvement of the experimental report to make a small paper, in order to maximize the role of the experimental class in the process of writing the experimental report.

III. THE MICRO-STUDY IMPROVEMENT OF MICROBIOLOGY EXPERIMENT REPORT

A. Emphasis on Small Papers of Experimental Report

At the beginning of the design of the microbiology experiment report, we should recognize the advantages of this kind of reform from the teacher to the student. Although it may bring more cumbersome workload in the concrete implementation, it is very practical for the training of undergraduate research thinking, the writing ability of undergraduate thesis and the cultivation of scientific research quality in the future. Teachers and students should pay full attention to the reform of the experimental report and understanding the purpose of the reform is not simply the increase of the space, but the enrichment of the content and the specification of the format.

B. Standardization of the Small Papers in the Experimental Report

The experimental report is a routine part of the undergraduate experiment and has long established a fixed format in the course experiment for a long time. Therefore, there are bound to be obstacles to the original model for the reform of the experimental report. How to break the barrier and standardize the small paper format of the experimental report is the first problem to be solved. First of all, the experimental report cannot be equated with the formal paper format. It should be the updating of the paper format. The preface evolves into the experimental principle. The follow-up includes experimental materials, the experimental procedures, the

experimental results and the discussion sections. Secondly, the standardization of each part of the content is for each part. Strict requirements, abandon the previous misunderstanding of experimental materials, experimental procedures, rough processing of specific details and slightly processing leads to simplification of the experimental report. The standardization of the key parts and the focus of the experimental report are mainly the discussion part. In the past, it is difficult to appear in the ordinary experiment report. For the standardization of this link, the deepening should be explained in the experimental class, which plays an important role in deep understanding of the principles and precautions of simple experiments.

For example, Gram staining experiments, a simple experiment in the past microbial experiments teaching, may be presented as the results in a simple experimental report containing several microscopic observations. Many students will only beautify the experimental results in order to cope. The experimental operation and the practice of the technology did not really complete the teaching of feedback theory through experimental teaching, and even fails to promote the purpose of theoretical teaching. In the small paper process of this experiment, the first part of the experimental principle is not a brief description of the distribution and location of the dye to describe the final experimental results, but should be a deep understanding of the theoretical class. It should be able to take this opportunity to have a clear understanding of the cell walls of Gram-positive and Gram-negative bacteria, and then emphasize the understanding of the whole experimental process for each step of the detailed writing, such as the selection of experimental materials and reagent preparation, the pre-culture of microorganisms, the choice of time in the specific operation process and the preparation of the experimental results should not only select the two best pictures, but also be a collection of data during the experiment. For example, poorly-performing images or smear-stained results prepared by sampling at different time points, comprehensively present various conditions of Gram staining. The last and most important part should belong to the discussion part. Although the Gram staining experiment is simple, it is affected by many factors, such as false positives, the results and analysis of false negative cases and the effects of ethanol staining time on experiments. Through the writing of experimental reports, it is important to analyze the various situations appearing in the experiment and deepen the understanding of the experimental content is of great significance.

C. Experimental Report on the Normalization of Small Papers

The experimental report is the routine part of the undergraduate experiment. The reform of the small paper form in experimental report should form a normal development on the basis of routine experiment instead of occasionally. It should also be promoted in related disciplines to improve the overall understanding of experimental teaching for undergraduates and mastery. The full-disciplinary implementation of the small papers in the experimental report is a way to cultivate applied-oriented innovative talents. Gradually normalized could cultivate students' good scientific

research habits of thinking independent and comprehensive in the whole process. Emphasis on literacy has an effective training value.

IV. DISCUSSION

Microbiology is a core professional course in biotechnology and pharmaceutical industries. It is also a highly practical science. The experimental operation part plays an important role in the whole curriculum system, not only to help the internalization and absorb theoretical knowledge, but also lays a foundation for the follow-up study of other professional courses. While we attach importance to the classroom teaching of the experimental class, we also introduce a small paper format in the reform of the experimental report [10]. Through the more detailed content and the specification of the format, the discussion is deeper. Develop students' habits of writing research articles and innovative consciousness from undergraduate experiments.

The culture of experimental report essays is not simply to train ability of the students to write essays roughly, but to give guidance in teaching in view of students' conflicting mentality about the tedious forms of expression. Through the reform, students could improve greatly at the end of each teaching and then at the end of the whole course.. Through training, students can make great progress in writing skills contests, undergraduate innovation projects and other tenders. In addition, through reforms, students could improve their understanding of the experimental understanding [11, 12]. The past experimental process or experimental report students pay more attention to the experimental results. The simplification of the experimental report also makes many experimental details not paid attention to. Student's learning also ignores these details. These details are often concerned about the confusion of future research workers, and the small papers of the experimental report can enable students to enlarge the details and promote students' ability to explore in details [13]. The ability of students also gains greater knowledge space and innovative thinking in inquiry. In short, through the reform process of this course, it is helpful to explore how to improve students' ability to write various scientific research materials through experimental teaching, and how to enhance students' thinking about experimental details and experimental problems

through small papers, which has the ability to cultivate students' innovative thinking ability.

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