

Application of Scientific Papers in Experimental Teaching of Pathophysiology

-The effect of scientific papers on the experimental teaching

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Abstract—Pathophysiology is an relatively abstract and theoretical bridge subject in medicine. It is also a functional experimental subject with strong practicality. Pathophysiology plays an important role in clinical medicine. As an important part of pathophysiology teaching, experimental teaching has become an important mean to train new talents in medical colleges or universities. Writing experimental report can cultivate students' scientific research thinking, logical reasoning ability, ability to comprehensively analyze problems and writing ability. There are many problems existing in the writing of pathophysiology experiment report. In order to improve the effectiveness of experimental teaching, we altered the traditional experimental report into a scientific paper report, and investigated the satisfaction of clinical medicine students participating in our courses. Through teaching reform, the teaching efficiency and student satisfaction are improved greatly, and the quality of medical personnel training skills is improved greatly as well.

Keywords—*Scientific paper; Experimental report; Pathophysiology; Functional experimentation*

I. INTRODUCTION

Functional experiment teaching is an important part of pathophysiology course system, and writing experiment report is an important link in experiment teaching. In the daily experimental teaching, we find that the traditional experimental report has many shortcomings [1], which cannot meet the all-round development of medical students. In order to change the current situation and improve the efficiency of experimental teaching, our department of pathophysiology has gradually changed the traditional experimental reports into scientific papers in the experimental teaching of pathophysiology in clinical medicine students since 2014. In the implementation process of these years, we have made continuous improvements, and conducted a large number of random questionnaires on clinical students. Now the results are reported as follows.

II. SUBJECTS AND METHODS

A. Participants

The subjects of this study were junior college students majoring in clinical medicine in our university in 2015. There were 812 undergraduate students majoring in clinical medicine

in our university in 2015. 200 questionnaires were randomly distributed, among which 100 were male students and 100 were female students.

B. Methods

The pathophysiology experiment was carried out for 6 times in total. Before the first experiment class, the writing format and requirements of the scientific report paper were sent to each student through various channels. In the first experiment class, it was further emphasized that the students were required to write in strict accordance with the contribution guide of Chinese journal of pathophysiology. Because the pathophysiology experiments are carried out in groups, the first writing of scientific papers is also submitted in groups. The scientific papers were submitted within two weeks after the first experiment, and then were strictly corrected by the instructor. The irregularities pointed out are fed back to the students, and the students are asked to write again so that each student in the group can master the writing norms. After the fourth experiment, each member of the group was asked to complete a research paper independently by the first author. The scores of the first revised paper and second papers were taken together as the final scores of the experimental papers, each 10 points, and the total score of the experimental papers was 20 points.

After the end of the experiment in the semester, 200 questionnaires were randomly distributed in each class to conduct a questionnaire survey on the form of the experiment report, which included personal performance ranking, degree of satisfaction, effectiveness, number of experimental reports, scoring rules, experimental scores, parts needing improvement and personal gains

III. RESULTS

A. Analysis of participants in experimental papers

A total of 200 questionnaires were distributed in this survey, 197 of which were valid, with an effective recovery rate of 98.5%. The effective recovery rate was 98% for boys and 99% for girls. Among the 197 valid questionnaires, there were 52 students ranked in the top 10 of classes, 48 students in the 10-20, 45 students in the 20-40, and 52 students in 40. The academic performance was found in all grades and had little impact on the questionnaire.

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B. Survey on Acceptance and Benefit of Scientific Papers

We divided students' acceptance and benefit of scientific paper reports into four levels. As can be seen from table 1, 88.95% of students think it is useful or very useful to change the experimental report into scientific paper report, and 85.5% of students are more or very happy with this form.

TABLE I QUESTIONNAIRE OF ACCEPTANCE AND BENEFIT OF SCIENTIFIC PAPER REPORT

Questionnaire items	Items	Frequence
Whether the report form of scientific paper is useful	A very useful	51.8%
	B useful	37.1%
	C general	9.6%
	D no use	1.5%
Whether the report form of scientific paper is acceptable	A willing	45.2%
	B favourable	40.6%
	C general	12.7%
	D disagree	1.5%

C. Investigation on the implimentation forms of Scientific papers

In order to further improve the enthusiasm of students, we furtherly launched investigation about the number of scientific papers, scoring form, test scores. According to the survey results, 90.3% of the students thought that it was reasonable to write 2-3 scientific papers per semester, 87.4% thought that it was reasonable to grade scientific papers only by teachers or by competition of scientific papers. 88.3% of the students thought that the score of scientific papers accounted for 20-30% of the whole course of pathophysiology was reasonable.

TABLE II THE RESULTS OF THE SURVEY ON THE FORMS OF SCIENTIFIC PAPERS

Questionnaire items	Items	Frequence
Complete numbers of reports	A. 5	1.5%
	B. 4	8.1%
	C. 3	40.6%
	D. 2	49.7%
Scoring form	A. only teacher grade	46.2%
	B. self-evaluation of students	0.5%
	C. Both cooperation	12.2%
	D. competition form	41.2%
Proportion of experimental score	A 20%	40.1%
	B 30%	48.2%
	C 40%	10.7%
	D 50%	1.0%

D. The advantages and insufficiency of scientific paper writing

From Table 3, it can be seen that although 5.1% of the students think that the report of scientific papers has low score, large investment, time-consuming and laborious, the rest of the students still agree with this form. All the students think that they are familiar with the basic format of paper writing, improve the ability of induction and summary, enhance the

ability of consulting literature, and strengthen the analysis and summary of the whole experiment through the writing of scientific and technological papers.

TABLE III ADVANTAGES OR DEFICIENCY OF SCIENTIFIC PAPER WRITING AND SUGGESTIONS

Items	Multiple Options	Multiple frequence
Scientific papers report gains or shortages	A. Familiar with the basic format of thesis writing	99.5%
	B. Improve the ability to summarize	99.5%
	C. Familiar with literature review ability	99.5%
	D. Strengthen the ability to analyze and summarize the whole experiment	99.5%
	E. Low score, high investment, time and effort	5.1%
	F. Appropriate proportion of input and harvest is acceptable	94.5%
Improvement in the scientific paper report	A. Increase the time of paper guidance in the experimental class	7.6%
	B. Feedback information after paper grading	22.8%
	C. Give lectures on thesis writing	55.8%
	D. improve students' interest in writing papers	13.7%

IV. DISCUSSION

Pathophysiology is a discipline that studies the laws and mechanisms of functional and metabolic changes during the occurrence and development of diseases, and plays a bridging role between basic disciplines and clinical disciplines. Experimental teaching of pathophysiology by replicating animal models of human disease. Help the students to verify relevant theories learned in the classroom, grasp of the development of related diseases, conditions, metabolic changes, development, mechanism, function, and combined with effective prevention principles and measures of pharmacology study disease smoothly into the clinical course of study and practice for the future lay a solid foundation, for clinical medical students, the importance of pathological physiology experiments is self-evident [2].

Experimental teaching is an important part of pathophysiology course, and writing experimental report is an important link in experimental teaching. The experimental report is a comprehensive reflection of the experimental situation. By writing the experimental report, students can comprehensively record, analyze, summarize and summarize the whole experiment, so that students' understanding of the whole experiment rises from sensibility to rationality.

Pathophysiology experiment design, most of the experiments have used the principle of control, randomness and repetition, which plays an important role in cultivating medical students' scientific research thinking. Through the analysis and discussion of experimental results, students' logical induction ability, comprehensive analysis ability and writing and expression ability can be cultivated, which is conducive to students' future summary of research data and writing papers [3].

Although the writing of the experiment report plays an important role, we found that there are many problems in the writing of the experiment report in the process of reviewing the experiment report. First, due to the fixed template of the experimental report, most students copy the operating procedures of the experimental guidance and fill in the experimental results when writing the experimental report. Even many students fail in the experiment and the experimental report is the same as the requirements of the experimental guidance, so they are not deeply impressed by the experimental content. Second, pathophysiological experiments usually require group division of labor and cooperation, so it is found in the experimental report that all the members of the whole group have the same experimental report, and the phenomenon of mutual plagiarism is repeated. Third, the focus of the lab report difficulty in experimental discussion, some students don't know how to discuss, some schoolmates discuss completely from the experimental results, the theoretical content of the textbook related copy on the experiment report, some students will find on the net without direct copying on his experiment report. In short, the writing quality of experimental reports has not been paid enough attention to in the teaching of pathophysiology experimental courses, which makes it difficult for the cultivated students to be qualified for future scientific research requirements, which is also a huge waste of experimental teaching resources [4].

Through the traditional experimental report instead of scientific papers, on the one hand, to help students be familiar with the basic format of writing scientific papers, on the other hand to improve the students' ability to sum up, the literature and analysis summary of the whole experiment ability, avoids the estimation of experiment report monotony and copying each other, help to train comprehensive medical talent. From the questionnaire, we can see that clinical medical students are very supportive of this form, with high degree of benefit and satisfaction and great harvest. In addition, the questionnaire also prompts us to constantly improve the report form of scientific papers. First, students are relatively unfamiliar with scientific paper writing, so we need to find ways to improve students' writing ability. For example, we can improve students' writing ability by giving lectures. Second, because each paper requires a lot of time to prepare, the number of papers should not be too many, 2-3 times is appropriate, accounting for 20% to 30% of the whole course score, and combined with formative evaluation, timely feedback, and continuous improvement. Third, the experimental results of the review to the teacher review mainly, can be combined with science paper competition, improve the enthusiasm of students. In the future research, we will also try to explore the

application of electronic teaching methods in undergraduate education, such as WeChat [5], Rain classroom and so on.

V. CONCLUSION

Through the students' experiment of scientific papers report writing, it not only stimulates students' enthusiasm for the study of pathophysiology theory and experimental operation, but also improves clinical medicine students' ability to write scientific research papers and solve problems comprehensively, which is conducive to the cultivation of innovative thinking and innovative ability, and lays a solid foundation for the cultivation of comprehensive and applied innovative medical talents.

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