



Research on the Application of Virtual Simulation Teaching Based on "Artificial Intelligence" Big Data

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Abstract:

This paper aims to explore the application effect of the virtual simulation teaching mode based on the background of "Artificial Intelligence" big data in medicine experiment class. Students from Class 1-14 of clinical medicine major in 2018 were the subjects of the survey. The 208 students with odd class numbers adopting the traditional teaching method were as the control group; the 215 students with even class numbers taking the virtual simulation teaching method were as the experimental group. Using SPSS software, the differences between the two groups of students were compared through questionnaires and experimental reports. The experimental report scores of the virtual simulation group were significantly better than those of the traditional teaching group. The learning difficulty, classroom activity, interest stimulation, ability to solve and analyze problems, knowledge updating ability, and the ability to integrate theory with practice in the virtual simulation group were significantly higher than those in the traditional teaching group, but the improvement in cooperation ability in the virtual simulation group is lower than that of the traditional teaching group. Combining the advantages of virtual simulation experiment and traditional experiment teaching can improve the quality of experiment teaching.

Keywords: *Virtual simulation teaching, Traditional Teaching, "Artificial Intelligence" Big Data, Evaluation, Medical experiments*

1 INTRODUCTION

With the rapid development of information technology, China's medical and health service pattern has undergone earth-shaking changes. From traditional medical treatment to digital medical treatment, and then to smart medical treatment, China's medical and health institutions are constantly upgrading and transforming under the power of information technology, and artificial intelligence is gradually applied in the field of medical and health services [1].

In medical teaching, more and more teachers in colleges and universities follow the technical progress of medical and health services. They begin to explore the teaching reform, such as switching the teaching mode from single to diversified development, and turning the interpretation of the traditional teaching mode to the development of the information technology teaching. In order to adapt to the current medical development and

meet the national requirements of "training practical medical talents", many kinds of teaching modes, online hybrid, and the basic technical knowledge of artificial intelligence are integrated into the course teaching. Medical experimental course is an important part of theoretical teaching, and as the proverb goes "learning for application", only through practical application can a student remember the theoretical knowledge deep in the heart [6]. The use of virtual simulation teaching in the experimental class can make the medical students better adapt to the needs of the work post after graduation.

The traditional teaching mode of experimental class mainly emphasizes the imparting of basic knowledge and training of basic skills, which is completed by teachers' explanation and demonstration, students' observation, case analysis and discussion, etc. It is a teaching mode in which teachers are the subject of explanation and students are passive learners.

Virtual simulation teaching is to display various experimental instruments and experimental facilities in a virtual form, and customize the experimental scene according to each experiment for virtual three-dimensional construction and other integration, so that operators get immersive experience and skills training [2].

The purpose of this paper is to evaluate the effect of the two teaching methods, discuss the reform of the teaching mode, optimize the classroom structure, and improve the quality of experimental teaching by comparing the two teaching modes of traditional teaching and virtual simulation teaching in experimental courses.

2. INFORMATION AND METHODS

2.1 General Informations

In this study, 2018 students of five-year clinical medicine major were investigated. There are 423 students majoring in Clinical Medicine for the class of 2018, including 14 classes, 239 boys and 184 girls, aged 20-24. Classes 1-14 were divided into two groups according to the odd and even class numbers. For the students with odd class numbers, all the experimental classes adopted the traditional teaching method. As the control group, there were 117 boys and 98 girls, with an average age of (21.94±0.93) years old. All the students whose class number is even adopt virtual simulation teaching method in the experimental class. As the experimental group, there are 112 boys and 96 girls, with an average age of (21.68±1.06) years old. There was no significant difference in age and gender between the two groups ($P > 0.05$). All students completed the teaching evaluation questionnaire and experimental report.

2.2 Teaching method

Traditional experimental teaching is to teach according to the requirements of the teaching syllabus, explain in detail the purpose, principle, operation method and matters needing attention of experimental operation, and then conduct on-site teaching, organize students to conduct operation, case analysis and discussion, and finally finish the experimental report after class. It is a teacher-led teaching form.

Virtual simulation teaching is carried out by virtual simulation teaching software platform. According to the requirements of the teaching syllabus, courses corresponding to the control group syllabus are selected for teaching, including video explanation of experimental purpose, knowledge theory, experimental operation and matters needing attention as well as online virtual experiment operation. In addition, full-time teachers were arranged to follow up the completion of students, conduct retrospective discussion and answer questions [4], and finally finish the experimental report after class.

The teaching mode is based on students' participation and interaction, supplemented by teachers' guidance.

2.3 Assessment Methods

The effects of traditional teaching and virtual simulation teaching were evaluated by teaching evaluation questionnaire and experimental report. Questionnaire survey was distributed and data were collected through the Platform of Wenjuanxing. Teaching evaluation mainly includes teaching method evaluation and teaching effect evaluation. Teaching method was evaluated from the aspects of course satisfaction, learning difficulty, experiment participation, classroom activity, interest stimulation and so on. The teaching effect is evaluated from the aspects of improving the ability of solving and analyzing problems, renewing knowledge, connecting theory with practice, cooperation and practice.

2.4 Data Analysis

SPSS 20.0 statistical software for data analysis was used for the analysis. The t test is used to compare the measurement data expressed as ($\bar{x} \pm S$). The chi-square test is used to compare the enumeration data expressed in rate (%), the test standard is $\alpha=0.05$.

3 RESULTS

3.1 Evaluation of experimental report results

The results of the virtual simulation group (93.2±2.4) were significantly better than those of the traditional teaching group (86.7±9.5) ($P < 0.05$). The details are shown in Table1.

Table1: Virtual simulation teaching group and traditional teaching group experimental report results comparison ($\bar{x} \pm S$)

Virtual simulation teaching	Traditional teaching	t	P
93.2±2.4	86.7±9.5	13.644	< 0.05

3.2 Evaluation of experimental teaching methods

In order to understand students' evaluation of traditional and virtual simulation teaching methods of experimental class, a questionnaire survey was conducted from the aspects of course satisfaction, learning difficulty, experiment participation, classroom activity, interest stimulation and so on. The learning difficulty, classroom activity and interest stimulation of the virtual simulation group were significantly higher

than those of the traditional teaching group ($P < 0.05$). The details are shown in Table 2 and Figure 1.

Table 2: Comparison of teaching effects between virtual simulation teaching and traditional teaching experimental courses [cases (%)]

	Virtual simulation teaching (n=208)	Traditional teaching (n=215)	χ^2	P
	High	High		
Course satisfaction	198 (95.2)	203 (94.4)	0.128	0.720
Learning difficulty	26 (12.5)	10 (4.7)	8.364	0.004
Experimental participation	178 (85.6)	185 (86.0)	0.019	0.890
Classroom activity	165 (79.3)	141 (65.6)	9.983	0.002
Interest stimulation	157 (75.5)	121 (56.3)	17.403	0.000

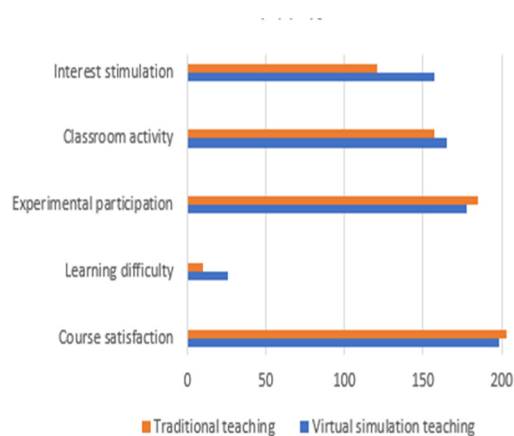


Figure 1: Evaluation distribution of virtual simulation teaching and traditional teaching experimental teaching methods

3.3 Evaluation of experimental teaching effect

In order to understand the students' evaluation on the effect of traditional teaching and virtual simulation teaching, a questionnaire survey was conducted from the aspects of improving the ability to solve and analyze problems, the ability to update knowledge, the ability to connect theory with practice, the ability to cooperate and the ability to practice. The improvement degree of solve and analyze problem ability, knowledge updating ability and integrate theory with practice ability in virtual simulation group was significantly higher than that in traditional teaching group, but the improvement degree of cooperation ability in virtual simulation group was lower than that in traditional teaching group ($P < 0.05$). The details are shown in Table 3 and Figure 2.

Table 3: Comparison of the teaching effect evaluation of virtual simulation teaching and traditional teaching experimental course [cases (%)]

	Virtual simulation teaching (n=208)	Traditional teaching (n=215)	χ^2	P
	Yes	Yes		
Improve the ability to solve and analyze problems	137 (65.9)	103 (47.9)	13.890	0.000
Improve knowledge updating ability	166 (79.8)	122 (56.7)	25.880	0.000

Improve the ability to integrate theory with practice	165 (79.3)	146 (67.4)	7.830	0.008
Improve cooperation ability	105 (50.5)	145 (67.4)	12.582	0.000
Improve practice ability	151 (72.6)	162 (75.3)	0.416	0.519

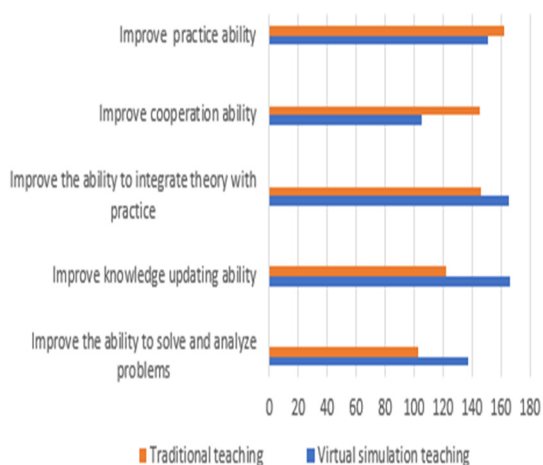


Figure 2:Virtual simulation teaching and traditional teaching experiment teaching effect evaluation distribution

4 DISCUSSION

Through the analysis of students' experimental reports, this study found that the virtual simulation group's experimental report was obviously more serious, and the experimental principles, experimental steps and discussion content were more detailed and rich, and some students even put forward new ideas, which made the virtual simulation group's performance It was significantly better than the traditional teaching group ($P<0.05$).

The degree of satisfaction (94.4%) and degree of participation (86.0%) of traditional experimental teaching and the degree of satisfaction (95.2%) and degree of participation (85.6%) of virtual simulation teaching are relatively high, indicating that students are satisfied with the content, design, methods, professors and other aspects of the course and are willing to participate in it. The students in the virtual simulation group thought that the learning difficulty was higher than that in the traditional teaching group. The main reasons were lack of instruction or unclear instruction, not enough detailed instruction of experimental methods, and not enough detailed teaching materials and textbooks. However, the interactive, intuitive, interesting and authentic nature of virtual simulation system can

stimulate students' interest. Meanwhile, it can break through the limitation of time and space to realize students' active and autonomous learning, interesting role playing, risk-free and repeated immersive learning and exercise, making the class more relaxed and pleasant and active.

The open virtual experiment environment can broaden students' experimental operation knowledge and stimulate students' innovation consciousness and ability through the design of diversified virtual simulation experiments [3]. Moreover, through retrospective discussion, students can benefit from instructive feedback, help them to master knowledge, improve the ability of linking theory with practice, as well as the ability of analyzing and solving problems. However, compared with traditional experimental teaching, this study also found that the virtual simulation experiment lacks communication links between students, which has little effect on cultivating teamwork consciousness [5].

5 CONCLUSIONS AND RECOMMENDATIONS

Virtual simulation experiment greatly enriches the teaching content of medical experiment courses, and is very helpful to improve the quality of teaching. In view of the many problems that still exist, we should improve the experimental teaching, method guidance and teaching materials in the course arrangement and design. With the advent of the era of science and technology, there is still great potential for virtual simulation teaching experiments in the future. In the future experimental teaching, it is hoped to make full use of the advantages of virtual simulation experiments and traditional experimental teaching, keep pace with the times and combine with the development of the current information age, to further improve the effect and quality of experimental teaching.

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