

## Application of WeChat Public Platform in Cultivating Scientific Research Ability of Medical Laboratory Undergraduates

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**Abstract:** Medical laboratory technology specialty requires college students to have certain scientific research ability, including excellent experimental operation skills and good scientific research thinking, so it is particularly important to cultivate and improve students' scientific research ability at undergraduate stage. With the widespread popularity of WeChat in the student community, this research group has carried out a practical exploration on the public platform of WeChat as a teaching aid for undergraduates majoring in medical laboratory. By comparing with previous students and analyzing and summarizing the results of practice with questionnaires, it is found that the application of the WeChat teaching platform plays an important role in improving students' enthusiasm for scientific research and solving the problems encountered in students' practical operation and scientific research training in a timely manner.

### 1. Introduction

In the training program of medical laboratory technicians, it is emphasized that professional theory and the cultivation of students' scientific research ability are the educational routes that must be implemented. As an undergraduate majoring in medical laboratory, the training of scientific research ability mainly includes the training of operational skills and scientific research thinking. Therefore, practical teaching methods must be innovated and improved on the basis of traditional teaching from the students' own reality, so as to improve the enthusiasm of students to participate in scientific research ability training and enhance the effect of practical teaching. The Wechat Public Platform is an important application software platform with functions of group delivery, automatic reply and user management. By establishing the Wechat Public Number, communication and interaction between specific groups can be achieved through the medium of text, pictures and language [2]. As the development mode of Internet + has attracted much attention, WeChat, as a powerful free instant messaging software, has been widely popularized among college students. Therefore, with the help of WeChat public platform, it is necessary for students to learn relevant knowledge and provide technical support for strengthening communication between teachers and students and sharing teaching resources in practice teaching. With the help of the public platform of "Taiyi Medical Clinic Biochemistry" created by the micro-communication, our team has continuously innovated teaching methods and accumulated teaching resources, and has achieved good results in training students' skills, operation and scientific research thinking.

## **2. Operation and use of Wechat public platform:**

### **2.1 Construction and Operation of Wechat Public Platform**

In August 2017, our team established the Wechat Public Platform "Clinical Biochemistry of Thai Medicine" as an assistant teaching tool for medical laboratory undergraduates of grade 2015 and 2016 to cultivate scientific research ability and improve professional quality. Students are guided by professional teachers. Through collecting all kinds of teaching materials comprehensively, classifying and editing the teaching materials properly, and through the public platform of Wechat, "Clinical Biochemistry of Thai Medicine", information is pushed and released for undergraduates of medical laboratory specialty in 2015 and 2016. These data mainly include the use of testing instruments, commonly used skills and theoretical knowledge related to medical testing. Examples are as follows: (1) Parameter setting and operation flow of semi-automatic biochemical instrument.(2)commonly used molecular biological manipulation techniques, including extraction of target genes, PCR amplification and gel electrophoresis analysis, These materials include text, pictures and video materials in various forms.(3)Medical laboratory technology related theoretical knowledge: including lipid metabolism, liver metabolism, kidney metabolism and related disease detection, etc.

### **2.2 Usage of Wechat Public Platform**

#### **2.2.1 Number of readings**

Since its establishment in September, 2017, the public platform of "Thai Medical Clinical Biochemistry" Weixin has been mainly aimed at undergraduate students of medical laboratory specialty in 2015 and 2016. It also provides learning resources, access and reading services for other active users. Data show that 545 fans are concerned about the micro-signal.

Taking students of undergraduate classes of 2015 and 2016 as subjects, it was found that students read more frequently on the public platform of "Thai Medical Clinic Biochemistry". 72% of the students read every push article. After one semester's public platform learning experience, 83% of the students thought it was "completely feasible" as an assistant teaching method. Through interviews, most students mentioned that using Wechat public platform as an assistant teaching means makes them clearly feel the convenience and efficiency brought by the flexible learning method of "online learning".

#### **2.2.2 Reading Contents**

(1) commonly used skill operations: "agarose gel electrophoresis" visits 292 times, "target gene amplification" visits 266, "the whole blood genomic DNA extraction steps" access 178, "how to set semiautomatic biochemical analyzer parameters" visits 592, "semi-automatic biochemical analyzer testing process" access 662;

(2) Medical laboratory theoretical knowledge: 189 visits to trace elements and vitamins, 169 visits to electrolyte and acid-base balance, 148 visits to understand diabetes, and 177 visits to abnormal lipid metabolism.

From the students' reading content, the average reading time of skill operation articles is 398, and the average reading time of theoretical knowledge articles is 171. It shows that students are more willing to choose the information of skill operation for reading and learning in the aspect of using Wechat platform to train scientific research ability.

#### **2.2.3 The form and popularity of learning materials provided by Wechat Public Platform**

The learning materials provided by Wechat Public Platform mainly include video, text, pictures and cartoons. According to the survey, the students' favorite is video data, accounting for 79.4% (250) of the survey population, followed by pictures (216), 68.6%. The third is cartoons, accounting for 56.8% of the survey population (179), and the last is text (127) for 40.3%.

### 3. Effect of Wechat Public Platform on the Improvement of Scientific Research Ability of Medical Laboratory Undergraduates

#### 3.1 Improvement of Skills and Operational Ability

Taking the students of Grade 2015 and 2016 who use Wechat public platform to assist teaching and the students of Grade 2014 who do not use Wechat public platform to assist teaching as the research objects, taking the total serum protein testing experiment as an example, the test data of skill operation test of the above three groups of students were collected respectively. Twenty-one quality control serum samples were used in the skill operation test. The total protein of samples was detected by the serum total protein detection kit (biuret method). The detection equipment was Weituo 200 semi-automatic biochemical analyzer. By analyzing the data of three groups of students in grade 2014-2016, it was found that the coefficient of variation of each group was 12.31%, 3.57% and 3.64% respectively, indicating that the detection precision was the highest in grade 2015, the second in grade 2016 and the lowest in grade 2014. The results are shown in Table 1. Further, the absolute errors of the total protein measured in the three groups were analyzed by variance analysis. The results showed that there were significant differences between the absolute errors of the total protein measured in different groups, as shown in Table 2. Taking the absolute error of the measured values as dependent variable, the results of multiple comparisons among the three groups showed that there were significant differences between the grades of 2014, 2015 and 2016, while there was no significant difference between the grades of 2015 and 2016, as shown in Table 3.

Table 1 Statistical analysis of measured values in different groups

Groups	sample size	Mean number	standard deviation	Mean 95%CI	minimum value	Maximum value	CV%
grade 2014	50	58.91	7.25	56.85-60.98	43.26	75.45	12.31
grade 2015	43	73.01	2.61	72.21-73.81	67.19	79.67	3.57
grade 2016	41	56.31	2.05	55.66-56.96	51.75	60.31	3.64

Table 2 Variance Analysis of Absolute Errors of Measured Values in Different Groups

Groups	sample size	Mean number	standard deviation	Mean 95%CI	F	P
grade 2014	50	5.61	4.53	4.32-6.90	25.057	0.000
grade 2015	43	2.03	1.61	1.54-2.53		
grade 2016	41	1.64	1.23	1.25-2.02		

Table 3 Multiple comparisons among different groups

Groups	Groups	Mean difference	standard deviation	Saliency
grade 2014	grade 2015	3.5766	0.6226	0.000
	grade 2016	3.9752	0.6307	0.000
grade 2015	grade 2014	-3.5766	0.623	0.000
	grade 2016	0.3986	0.6534	0.543
grade 2016	grade 2014	-3.9752	0.6307	0.000
	grade 2015	-0.3986	0.6534	0.543

\*The significant level of mean difference was 0.05.

## 3.2 Enhancing the Ability of Scientific Research and Innovation

### 3.2.1 Student project declaration and award-winning situation of skill competition:

According to statistics, there are 7, 10, 15 and 17 innovative projects declared and set up by students of grade 2013-2016, respectively. See Figure 1. The data show that 32 projects have been set by students in grades 2015 and 2016 who use Wechat public platform for assisted instruction, while 17 projects have been set by students in grades 2013 and 2014 who do not use the assisted instruction technology. Grade 2015 undergraduates in Shandong Province won the second prize in the second inspection skill contest of morphology, one first prize in a single event, three second prizes and one third prize. Two students representing the college participated in the 2nd "Zezhong Cup" National College of Medical Laboratory Technology Online Morphology Competition, and won the first prize and the second prize. It has achieved a breakthrough that medical laboratory students in our university have won the first prize in the national skill competition.

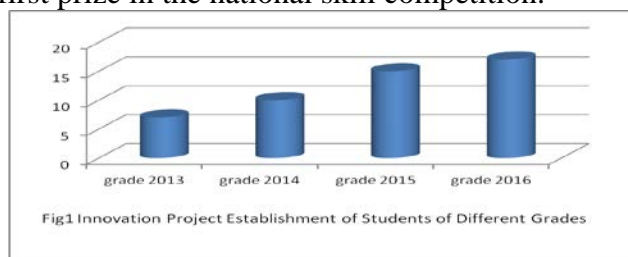


Fig.1

### 3.2.2 Publication and postgraduate entrance examination of students:

From 2013 to 2016, students published 1, 3, 5 and 7 core scientific research papers, respectively, as shown in Figure 2. Among them, twelve were published by students in grades 2015 and 2016, while four were published by students in grades 2013 and 2014. The number of papers published by students in grades 2015 and 2016 increased significantly.

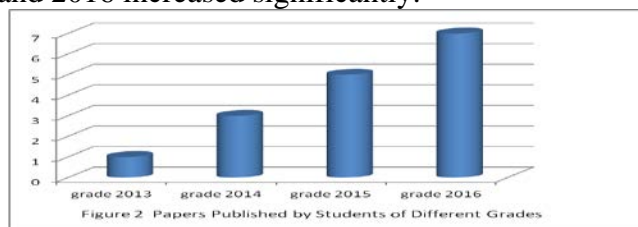


Fig.2

## 4. Discussion

The training program for undergraduates of medical laboratory requires students to master proficient operation skills and cultivate good scientific research quality to meet the needs of carrying out scientific research in clinical work and theoretical research in the future. Therefore, how to gradually cultivate the scientific research thinking of laboratory students and improve their innovative ability and level in teaching has become an important part of the construction of medical laboratory specialty and the cultivation of students.

In order to improve students' ability of scientific research and innovation, this research group adopted Wechat public platform to assist teaching, which mainly experienced three stages of growth. First, pre-investigation and demonstration. Before the construction of the Wechat Public Platform, the survey conducted by the research group on the learning ways of students majoring in Laboratory Science showed that the main way for students to acquire professional knowledge was "teacher teaching", followed by "reading professional books by themselves" and "occasionally" 55% of students who studied online. This shows that students are still accustomed to acquiring knowledge

through classroom teacher teaching mode, and have not yet been fully utilized. Self-regulated learning habits of online learning with network resources. At the same time, most students are basically satisfied with the traditional classroom teaching mode, which shows that the traditional teaching mode can not meet the students' learning needs, nor can it meet the needs of students to cultivate and improve their scientific research ability through independent learning. Therefore, our group decided to fully explore the use of Wechat Public Platform as an assistant means of teaching practice, in order to meet the needs of students' autonomous learning, and help improve students' scientific research and innovation ability. Secondly, the operation team of Wechat public platform should be integrated and formed to maintain the operation efficiency of the public number. The team is mainly composed of undergraduates who are familiar with and good at using self-Media technology at the levels of 2015 and 2016. They also serve as topic selection, editing and pushing of push articles. In this process, students' ability to learn new technology and knowledge independently is trained and exercised, and their ability to understand and summarize theoretical knowledge is strengthened. With the passage of time, the operation team members gradually formed a good human resources echelon among students in accordance with the model of "higher level with lower level", which gradually expanded the influence of Wechat public platform. At the same time, it also makes the accumulation of teaching resources of public teaching platform more and more abundant. Thirdly, we should timely understand the students' need for and mastery of professional knowledge, and monitor the teaching effect of this assistant teaching method. To this end, we will use Wechat Public Platform to assist the teaching of 2015 and 2016 students and accept the traditional teaching model of 2014 students made a comparison, found that students in 2015 and 2016 in the final skill operation examination of serum total protein detection, the accuracy of detection is significantly better than students in 2014, the difference between the two has statistical significance. By summarizing the papers published by students in grades 2013-2016, it is also found that students in grades 2015 and 2016 have published 12 core papers, while students in grades 2013 and 2014 who accept the traditional teaching mode have only published 4 core papers, and the number of papers published by students in grades 2013-2016 shows an increasing trend year by year. The above two data show that using Wechat public platform to assist teaching plays an important and positive role in improving students' skills and operation level, stimulating students' interest in scientific research, and cultivating students' scientific research thinking.

With the help of questionnaires and small-scale interviews and exchanges, the research group acquires three aspects of information: First, the information of students' groups.

As for the advantages of assisting teaching with the help of Wechat public platform, students generally believe that this teaching method can enable students to make full use of fragmented time for autonomous learning, and improve the effect of pre-class preview. At the same time, we can consult the resources of Weixin public platform whenever problems arise in the training of scientific research ability. Through online learning and off-line discussion, we can solve the problems in time. Secondly, regarding the types of Wechat public numbers students like, the survey shows that students have a strong interest in Wechat public numbers related to their major, 86% of whom are "very willing" to read, and 72% of the articles pushed by "clinical biochemistry" public numbers. This shows that students are very receptive to this kind of articles, which can make full use of fragmentary time, rich in content, flexible and diverse. Learning style; In the form of learning resources, students like video and picture materials best. Therefore, more vivid videos and pictures should be provided in the editing process to improve students' reading interest in the future. To what extent can the public platform of "clinical biochemistry" Weixin meet students' scientific research needs, 26% of the students choose to meet, and 49% choose "basic satisfaction". This shows that the public platform of Wechat needs to further strengthen communication with students, optimize teaching resources, and improve the pertinence of training students' scientific research ability, so as to help more students to use the teaching platform, strengthen self-learning, and constantly improve the quality of scientific research. Thirdly, although the "clinical biochemistry" Wechat public platform has only been running for two years, and the teaching platform needs to be improved in many aspects, 83% of the students choose "very feasible" for the feasibility of using the "clinical biochemistry" Wechat public platform

to assist teaching. It shows that students have deeply realized the advantages and important role of this teaching method in the process of using this teaching platform for learning and scientific research training, and indirectly proves the necessity of persisting in this teaching mode for a long time.

## **5. Conclusion**

The relevant national laws and regulations on education show that the development of education in China is closely related to the speed of the development of information technology. The two-year teaching reform practice of our research group has also proved that the application of "clinical biochemistry" Wechat public signal as an auxiliary means in the cultivation of scientific research ability of medical laboratory technology students has achieved remarkable results in students'skill operation and scientific research thinking training. This kind of teaching method embodies three-dimensional and multi-directional teaching ideas to cultivate students'scientific research ability. It can make students make full use of fragmented time, study at any time and anywhere, improve the enthusiasm of students to cultivate scientific research ability, and improve the timeliness of learning and training. At the same time, this teaching method can integrate all kinds of resources, such as classical textbooks, network video and pictures, which is conducive to the formation of a divergent training framework with theoretical knowledge, practical skills, scientific research and training as the core, covering basic skills operation, the latest scientific and Technological Development and clinical application. It can improve students'self-learning awareness, reduce teachers' repetitive work, and improve teachers'ability to learn independently. The efficiency of both teachers and students plays an important role.

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