

# Exploration on the Application of Duifene Teaching Platform in the Teaching Reform of Analytical Chemistry in Medical Universities

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## Abstract

**Objective:** To explore the teaching effect of Duifene Teaching Platform on analytical chemistry courses in medical colleges and universities. **Methods:** Students majoring in Traditional Chinese Medicine were selected as study subjects, who were divided into Experimental Class and Control Class respectively. The Experimental Class adopted a teaching mode based on Duifene Platform, while the Control Class adopted a traditional teaching mode, and a questionnaire survey was carried on to research object. **Results:** Comparing the final grades of the two classes, the result of the Experimental Class was slightly higher than that of the Control Class, and students in the Experimental Class were satisfied with the new teaching mode. **Conclusion:** Duifene Teaching Platform enriches forms of classroom teaching and makes communications between teachers and students more convenient, which is helpful to the cultivation of students' self-learning ability and is worthy to be used as a reference in the teaching of medical colleges and universities.

## Keywords

Duifene Platform, Medical Universities, Analytical Chemistry, Information Technology, Auxiliary Teaching, Mobile Learning

## 1. Introduction

Duifene is a new generation of teaching platform facing mobile Internet and a new teaching platform customized for Chinese teachers (Sun, 2018). With the development of the Internet, more and more digital resources and technologies have been applied to the field of medical education. As a mobile-oriented Internet teaching platform, Duifene has functions including homework receiving, correcting and sharing, random grouping, forum discussion, in-class tests,

teaching surveys, sending notices, checking attendance and so on, and the platform also has the function of data recording, which is simple, quick, practical and easy to use, so that it has gradually become a teaching management tool for teacher services (Deng, Wang, Yuan, Liu, & Zhang, 2019). Unlike learning platforms relying on computer terminals, terminals of Duifene are mainly mobile intelligent devices, because many students in China's minority areas do not have a computer, but almost everyone has a smartphone, so PAD Classes based on Duifene are beneficial to realize "mobile learning", which is conducive to the realization of "learning everywhere and anytime".

Analytical chemistry is an important basic course of medical specialty and a compulsory course for students majoring in pharmacy and examination in medical colleges and universities, which plays an important linking role in the course system of medical talent cultivation (Liu, Ji, Hu, & Feng, 2019). Analytical chemistry courses involve knowledge of many subjects, which is more difficult for students in medical colleges for Chinese minorities; as it is difficult to grasp within limited class time, many students have reflected that the course contents are heavy, key and difficult knowledge cannot be fully mastered, interactions with teachers after class are limited, and they cannot timely solve problems in their study. The application of Duifene Platform can realize a seamless connection before, during and after class, make effective use of time after classes and realize effective communications between teachers and students, which plays an important role in improving students' initiative and enthusiasm in learning.

## 2. Research Objects and Methods

### 2.1. Research Objects

Undergraduate classes majoring in Traditional Chinese Medicine in Youjiang Medical University for Nationalities are taken as research objects, the undergraduate classes majoring in Traditional Chinese Medicine in 2017 are taken as the Experimental Group and those of 2018 are taken as the Control Group. Analytical chemistry courses were given to all the above-mentioned classes in the first semester of the 2<sup>nd</sup> grade. The course took 54 class hours, among which theory courses took 36 hours and practice courses took 18 hours. *Analytical Chemistry* of the 8<sup>th</sup> edition was selected by all of them as the textbook, which was edited by Chai Yifeng, People's Medical Publishing House. Basic conditions of students in the two groups, including sex, age and basics, etc., were comparable.

### 2.2. Research Methods

Instructors create a Duifene Teaching Platform and notify students in experimental classes to apply for admission to the platform, which is requested to be registered with real names and school numbers, and issue relative use instructions to students. Requirements for teachers in each class are as follows: 1) Online attendance: Students sign in the platform; 2) Online course resources: Before classes, teachers should push relevant learning materials to Duifene plat-

form so that students can study independently; 3) Online classroom questioning: In order to make the classroom atmosphere more enthusiastic, three types of questioning modes are provided: random questions, hot answers and roll-call questions; 4) Group discussion: Duifene Teaching Platform provides two modules, namely random grouping and manual grouping, to group students; 5) Online exercise: After each chapter is completed, the teacher should carry on a comprehensive exercise on the platform; 6) Achievement book: The application of an achievement book can analyze and evaluate students' mastery of what they have learned, and make it more timely and convenient for teachers to grasp students' learning effect; 7) Teaching evaluation and questionnaire: Teachers can design the teaching evaluations and issue questionnaires according to the need, so that they can know the teaching quality and improve deficiencies to make the teaching quality evaluation system more complete. The Control Class adopts the traditional teaching mode.

### 2.3. Effectiveness Evaluation

After the term examination, 66 students were randomly selected to conduct a questionnaire survey, students were given a questionnaire to evaluate their satisfaction and learning effect of the teaching model based on Duifene Platform. Each item of the questionnaire is rated through Likert 5-grade scoring. Evaluation contents of the questionnaire include: 7 aspects including improvement of learning interest, improvement of learning motivation, improvement of language skills, promotion of timely communications between teachers and students, improvement of learning abilities in fragment time, activation of classroom atmosphere, and improvement of the ability to analyze problems, etc. (see **Table 1**), and there was also a satisfaction evaluation of students in the Control Group on the learning platform (see **Table 2**).

**Table 1.** Teaching effect scoring of experimental class and control class (n = 66, %).

Survey items	Experimental Group (n = 33, %)			Control Group (n = 33, %)		
	Very satisfied	Satisfied	Satisfaction rate	Very satisfied	Satisfied	Satisfaction rate
Improve learning interest	36.36	51.52	87.88	9.09	33.33	42.42
Improve learning motivation	33.33	54.55	87.88	12.12	30.30	42.42
Improve language skills	30.30	57.58	87.88	12.12	24.24	36.36
Promote timely communications between teachers and students	33.33	57.58	90.91	18.18	33.33	51.52
Improve learning ability in fragment time	39.39	48.48	87.88	15.15	30.30	45.45
Activate classroom atmosphere	45.45	39.39	84.85	15.15	48.48	63.64
Improve the ability to analyze problems	36.36	51.52	87.88	12.12	33.33	45.45
Total average score	36.36	51.52	87.88	13.42	33.33	46.75

**Table 2.** Evaluation of students' satisfaction with learning platform in experimental class (n = 33, %).

Survey items	Very agreed	Agreed	Consent rate
Duifene Platform is helpful for learning at ordinary times	24.24	63.64	87.88
Duifene Platform is helpful for accessing to the required learning materials	33.33	51.52	84.85
Like the mode of auxiliary teaching on Duifene Platform	27.27	54.55	81.82
Duifene Platform can promote after-class reviews	21.21	63.64	84.85
Information technology application ability	30.30	60.61	90.91
Learning platforms make teaching quality evaluation system more complete	39.39	45.45	84.85
Learning platforms can better track and grasp the learning effect	33.33	51.52	84.85
Total average score	29.87	55.84	85.71

## 2.4. Statistical Method

The data was processed and analyzed by SPSS 22.0 software. The enumeration data was expressed as n (%) and the measurement data as ( $\bar{x} \pm s$ ).

## 3. Results

### 3.1. Evaluation of Teaching Effect of Experimental Group and Control Group

Findings of teaching effects of the Experimental Group and the Control Group are shown in **Table 1**. Students' evaluations of the teaching mode based on Duifene Platform are generally better than those of the traditional teaching mode. Among them, scoring intervals of Duifene Platform are mainly concentrated on very satisfied and satisfied, the total average satisfaction rate is 87.88%, while that of the traditional teaching mode is mainly concentrated on the general, followed by the satisfied. Since there are few students who are not satisfied or not very satisfied or the proportion is extremely low, the remaining scoring intervals basically fall into the general intervals.

### 3.2. Students' Satisfaction Evaluation on Learning Platform in Experimental Group

At the end of the course, satisfaction of students in the Experimental Group with the teaching model of the teaching platform was surveyed through a questionnaire. The results showed that (see **Table 2**), scoring intervals of Duifene Teaching Platform were mainly concentrated on very satisfied and satisfied, and the total average satisfaction rate was 85.71%. Since there are few students who are not satisfied or not very satisfied or the proportion is extremely low, the remaining scoring intervals basically fall into the general intervals.

### 3.3. Comparison of Students' Scores in the Control Group and the Experimental Group

On the aspect of performance of analytical chemistry, the final examination

score of the Experimental Group was ( $78.63 \pm 8.442$ ), the comprehensive score was ( $84.93 \pm 5.208$ ), the pass rate was 100%, the lowest score was 71.86, and the highest score was 96.49; the final examination score of the Control Group was ( $76.98 \pm 7.699$ ), and the comprehensive score was ( $82.01 \pm 5.633$ ). Scores of the Experimental Group were slightly higher than those of the Control Group. In this study, the teaching mode based on Duifene Platform was adopted. With the reduction of teaching time in classes as well as the increase in students' self-study and the discussion time, students' knowledge consolidation and understanding are no less than those of the Control Class, and the teaching effect is more ideal after implementation of the new teaching mode.

#### 4. Discussion

The fundamental problem of education in China and the world today is how to break through the traditional teaching methods based on indoctrination pattern. With the rapid development of information technologies and the urgent need of teaching reform, it is required that reformers of undergraduate education actively explore new teaching methods. Education informationization is an inevitable trend in the information age, which is supported by information technologies, based on students and attaches importance to individualized developments of students (Wu, Lan, Huang, Wei, Cao, & Wei, 2020; Ni, Li, & Huang, 2019). With the help of Duifene Platform, the means of teaching are greatly enriched, which makes it more convenient for students to make full use of network platforms and resources to have independent pre-study, track the latest progresses in related fields, enhance students' learning enthusiasm and initiative and promote barrier-free communications between teachers and students.

1) Strengthen the integration of information technologies and curriculum teaching

Duifene Platform promotes the development of universal and mobile learning, the teaching mode based on this platform is to make use of the basic theory of mobile learning as well as to deeply integrate information technologies and teaching, so that learning can be "everywhere and anytime" (Cao, 2019). By using Duifene Platform, key issues and learning-related contents concerned by students can be pushed at any time. In classes, students can use the platform to answer questions or feedback votes, while after classes, it can push expanded reading materials to promote knowledge transfer and in-depth thinking. Through the analysis of results of the questionnaire on Duifene Platform, 87.88% of students in the Experimental Class think that the platform is helpful to the study at ordinary times; 84.85% of students in the Experimental Class think that the platform is helpful to obtain required learning materials; 90.91% of students in the Experimental Class think that the platform improves the ability of information technology application. 87.88% of students in the Experimental Class think that the platform improves the ability of learning in fragment time. 90.91% of students in the Experimental Class think that the platform im-

proves the ability of information technology application.

### 2) Enhance students' interest and enthusiasm in studying Analytical Chemistry

Duifene Platform makes full use of modern network technologies and mobile terminals, whose function design is in line with current college students' cognitive characteristics and psychological expectations (Zhang, Mi, & Jing, 2020). Through the analysis of results of the questionnaire on the platform, 81.82% of those in the Experimental Class like the auxiliary teaching mode aided by Duifene Platform; 87.88% of students in the Experimental Class think that using the platform can increase their interest in studying analytical chemistry; 84.85% of those in the Experimental Class think that using the platform can help activate classroom atmosphere; 87.88% of those in the Experimental Class think that using the platform can improve their learning motivation.

### 3) Promote timely communications between teachers and students

Traditional analytical chemistry classroom teaching relies too much on teachers but ignores the independence of students, who also cannot give full play to their initiative in thinking, emotional exchanges cannot be better realized among students or between students and teachers, which affects the result of analytical chemistry course study, meanwhile it is difficult for teachers to communicate with students at extracurricular time, which is not conducive to teaching information feedbacks (Sun, Zhang, Su, Chen, & He, 2020). Through the analysis of questionnaire results on Duifene platform, 90.91% of students in the Experimental Class think that using the platform can promote timely communications between teachers and students; 84.85% of them think that the learning effect can be better tracked and mastered through the platform. 84.85% of them think that the evaluation system of teaching quality can be improved by Duifene Learning Platform.

## 5. Conclusion

In the era of "Internet plus Education", we should promote the integration of information technology and curriculum education, update teaching concepts, reform the existing classroom teaching mode, and provide students with rich and colorful educational environment and learning tools. The application of Duifene platform in analytical chemistry course in medical colleges and universities can achieve the student-centered education idea, better realize seamless-docking learning with students on-line and off-line, and stimulate students' enthusiasm and study interest to the greatest extent. However, because teaching needs to be achieved through mobile terminals, there are still problems such as teachers' comprehensive quality needing to be further improved, students' excessive use of mobile phones and so on. It is a new teaching mode to complete teaching processes by means of Duifene Platform, so higher requirements are put forward for teachers' quality, which can also inspire teachers to learn and understand new teaching modes. For students, Duifene Platform is helpful for

them to develop their self-study ability as well as promotes them to form good study habits and learn more actively. This teaching model has also driven the in-depth integration of new technologies and education and teaching, advances the stable development of education and teaching, which is worthy to be used as a reference in medical universities teaching.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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