

# Full ability driven teaching reform and practice of pharmaceutical chemistry experiment from the perspective of professional certification

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**Abstract:** pharmaceutical chemistry experiment plays an important role in the contemporary higher pharmaceutical education. This paper uses the full ability driven teaching mode to reform and practice the pharmaceutical chemistry experiment course from the perspective of professional certification. By optimizing the course content, improving the scoring mechanism and optimizing the management system, students' learning ability, practical operation ability, design and innovation ability are stimulated. Team cooperation ability, problem analysis ability, problem solving ability and communication ability make the pharmaceutical chemistry experiment course play a bridge role between pharmaceutical theoretical knowledge and practical operation.

**Key words:** professional certification; Pharmaceutical chemistry experiment; Full ability driven teaching mode

Professional certification was introduced into China in the 1980s as an important means to ensure the quality of higher education, and also an important measure to improve the quality of higher education personnel training in China. With the rapid development of pharmacy, the cultivation of pharmaceutical talents has become the key to promote the development of the pharmaceutical industry. Pharmaceutical professional certification is an important guarantee to improve the quality of pharmaceutical education personnel training in China. Its implementation conforms to the development trend of higher pharmaceutical education and is the internal requirement for the sustainable development of pharmaceutical major.

Pharmaceutical chemistry is an applied discipline that includes interdisciplinary and interdisciplinary penetration. It is an important professional basic course for pharmacy. Pharmaceutical chemistry, as an important bridge for the cultivation of pharmaceutical undergraduate students' professional ability, has a strong theoretical and practical nature. As the practice and expansion of the basic knowledge of medicinal chemistry theory, medicinal chemistry experiment aims to cultivate students' basic experimental operation ability, experimental design innovation ability, problem analysis ability, problem solving ability and team cooperation and communication ability, so as to achieve the combination of theory and practice, and realize the integrated teaching from foundation to specialty to practice.

The main reform of the curriculum involved in pharmaceutical professional certification is to increase the proportion of experimental class hours in the total curriculum, especially the subjects based on chemistry experiments. Full ability driven teaching refers to the comprehensive training and development of students' abilities in all aspects on the basis of mastering knowledge, so as to achieve all-round development. Based on the perspective of professional certification, this paper carried out the full ability driven teaching reform in the pharmaceutical chemistry experiment course, and improved the students' learning ability, practical operation ability, design innovation ability, team cooperation ability. The ability to analyze problems, solve problems, and communicate can meet the needs of cultivating high-quality, innovative, and fully capable pharmaceutical talents in the new century.

## 1. The traditional mode of pharmaceutical chemistry experiment course and its disadvantages

### 1.1 The experimental content is single, so it is impossible to combine theory with practice

The purpose of pharmaceutical chemistry experiment is to consolidate students' theoretical knowledge and cultivate students' practical operation ability. However, at present, the content of pharmaceutical chemistry experiment is generally limited to the synthesis and verification of drugs. After the experiment, students only master the shape and basic properties of synthetic drugs, but are not familiar with its operation principle. The adaptive experimental conditions and possible impurity sources are not well understood, and the combination of theory and practice is not possible.

### 2.2 The proportion of confirmatory experiments is too large, and the design of innovative experiments is less

The traditional medicinal chemistry experiment teaching is mostly cramming education. The experimental course is generally designed with good experimental content. Students can get the experimental results by operating according to the set experimental conditions, so that students do not have a clear understanding of the experimental content and results, and it is difficult to cultivate students' ability to [Design innovation ability, problem analysis ability and problem solving ability].

## 2.3 Inappropriate grouping of experiments and management problems

Grouping experiments are carried out by fixed students in fixed time periods in fixed laboratories. However, at present, there are many problems in medicinal chemistry experiments, such as the large number of experimental groups, the limited space, and the lack of sufficient opportunities for students to operate. These problems will make students form lazy psychology, which will evolve from operating experiments to watching experiments and suppress students Teamwork and communication skills.

## 2.4 Problems of assessment system

The traditional pharmaceutical chemistry experiment assessment system is mainly based on experimental results and experimental reports, which may lead to the phenomenon that students do not carry out experimental operations, but rely on the same group of personnel to obtain higher scores, which can not fully investigate the students' experimental operation ability, and also has a certain impact on the final performance evaluation of students' pharmaceutical chemistry course.

## 2. Construction of pharmaceutical chemistry experiment course from the perspective of professional certification

### 2.1 Course objective setting

Pharmaceutical chemistry experiment is an important professional basic experimental course for pharmaceutical students, and it is an experimental subject based on synthetic experimental research. The students trained in this major should have good ideological and moral quality, scientific and cultural quality, professional quality and physical and mental quality. Integrate all theoretical knowledge, practical skills and scientific ability, and form an organic knowledge system to deepen understanding, master and flexibly use. Realize the cultivation of students' ability of independent innovation, finding and solving problems. The content of the experiment requires that one or several drugs can be synthesized from basic chemical raw materials through multi-step reactions, so as to further exercise the experimental skills of chemical synthesis, and cultivate their ability to design experimental schemes, analyze problems and solve problems relatively independently, so as to lay the foundation for the transition to the graduation thesis research stage.

#### 2. Construction of pharmaceutical chemistry experiment course

Curriculum construction includes the construction of curriculum objectives, the implementation and evaluation of the curriculum. Curriculum objectives are the specific value and task indicators of the curriculum, and are the basis for the implementation and evaluation of the curriculum. Curriculum objectives guide the construction of the curriculum. The degree of achievement of curriculum objectives is a key indicator to measure the achievement of output oriented curriculum objectives in Colleges and universities. At the same time, the content of pharmaceutical chemistry experiment courses and curriculum objectives show different supporting relationships.

## 3. Reform and practice of full ability driven pharmaceutical chemistry experiment course

At present, there are some deficiencies in the pharmaceutical chemistry experiment, such as single experimental content, excessive proportion of confirmatory experiments, inappropriate experimental grouping, management system, assessment system, etc. Therefore, it is necessary to reform and practice the existing pharmaceutical chemistry experiment teaching mode through the full ability driven teaching mode.

### 3.1 Implementation of full ability driven teaching mode

The full ability driven teaching mode includes seven abilities, as shown in Figure 1.

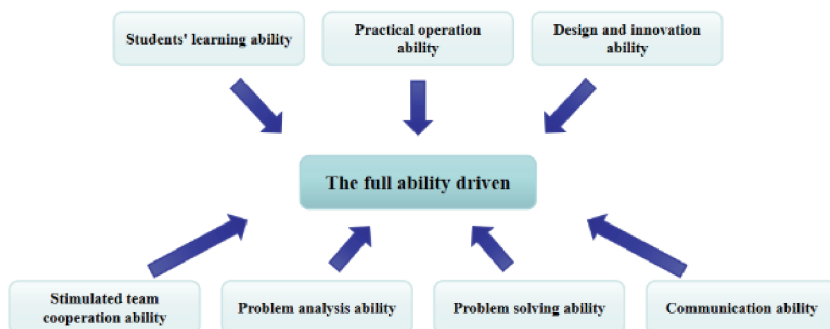


Figure 1 full capacity driven

(1) Course learning ability: to improve course learning ability is mainly to consolidate students' mastery of professional knowledge and combine theory with practice. First of all, teachers can issue preview notice through the network platform, so that students can complete the preview report according to books and literatures, and also let students consult the history of drug discovery, so that students can understand the difficult process of drug development and the difficulty of researchers, and gradually penetrate and cultivate the noble feelings and sense of mission of making contributions to the pharmaceutical industry of the motherland.

(2) Design innovation ability, problem analysis ability and problem solving ability: in the past pharmaceutical chemistry experiment teaching, students' experiments are relatively mature traditional synthesis experiments. In order to change the disadvantages brought about by the traditional teaching scheme, the teacher can publish the experimental content and let the students independently consult the literature and books to choose the experimental synthesis scheme or identification method, submit the preview report and finalize the feasible scheme with the teacher, and explore and analyze the different experimental results that can be brought about by different experimental conditions, According to the experimental results, the advantages of each scheme and the solutions to possible problems are discussed.

(3) Team cooperation ability and communication ability: pharmaceutical chemistry experiments are mostly synthetic experiments, which have the characteristics of many operation processes, complex experimental conditions and so on, and are generally carried out with the cooperation of multiple people. However, at present, there are many problems, such as the large number of people, the large number of groups and the tight site. In order to avoid this problem, experiments can be carried out in batches for classes with a large number of students, and the number of experiments in each group can be controlled to avoid the phenomenon that the experiment is not positive due to the excessive number of groups. When completing the preview report and experimental operation, it is necessary to work with the team members to strengthen the students' team cooperation ability and communication ability.

(4) Practical operation ability: at present, the performance evaluation of experimental courses is mainly based on experimental reports, which can not correctly measure the degree of students' mastery of experimental skills. To solve this problem, we can control the number of students in each experimental class, and randomly record classroom questions to the experimental class performance. At the same time, the school should also update the experimental instruments in time, Avoid reducing students' interest in learning due to backward instruments and equipment.

### 3.2 Evaluation mode of pharmaceutical chemistry experiment under full ability driven Teaching

According to the full ability driven teaching mode, the performance evaluation of students' pharmaceutical chemistry experiments was reformed, as shown in Figure 2. The evaluation of preview report accounts for 20% of the total score of the experimental class, the evaluation of daily performance accounts for 15% of the total score, the evaluation of experimental operation accounts for 35% of the total score, and the evaluation of experimental report accounts for 30% of the total score. The assessment of experimental results should be carried out in every link to actively mobilize students' learning enthusiasm and improve students' abilities in all aspects.

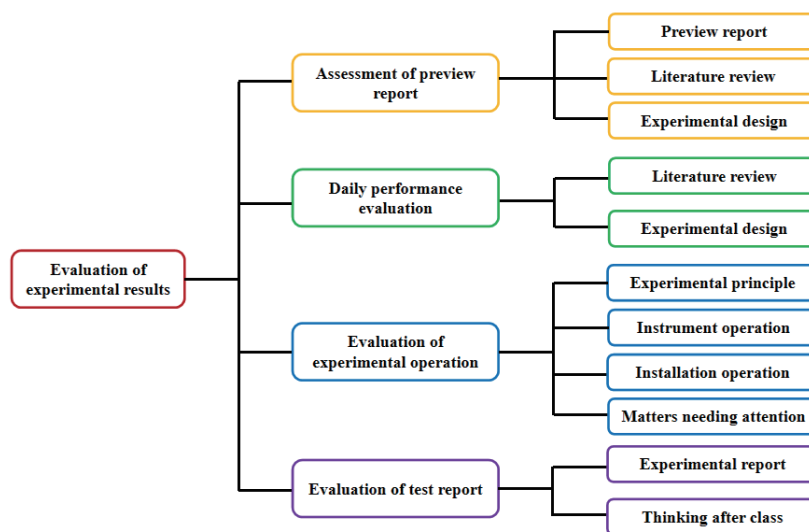
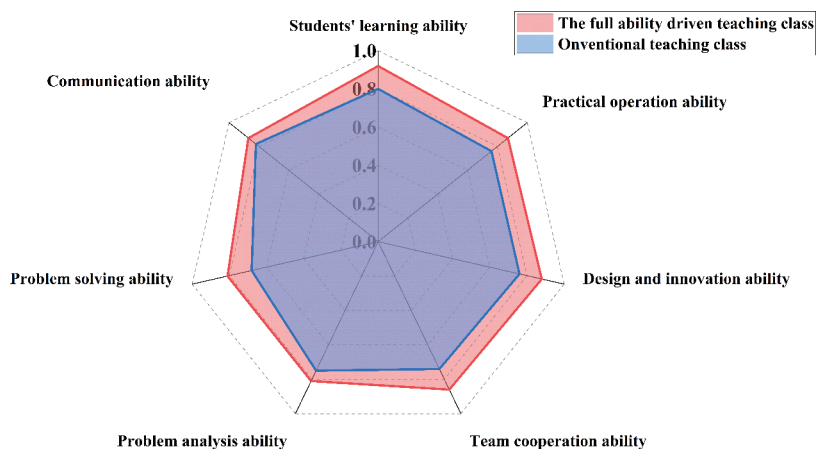


Fig. 2 full capability driven assessment mode of pharmaceutical chemistry experiment

### 3.3 Teaching effect of pharmaceutical chemistry experiment under the full ability driven Teaching

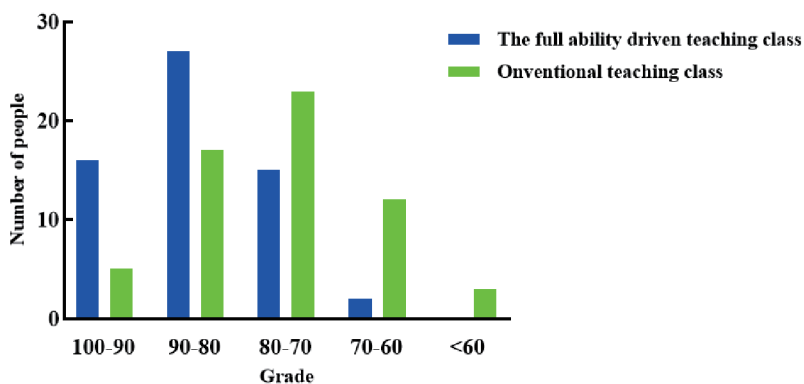
(1) Full capability comparison: for evaluationThe application effect of full ability driven teaching mode in pharmaceutical chemistry experiment will be evaluated and compared from seven abilities. The evaluation results show that the scores of the full ability driven

teaching class are higher than those of the conventional teaching class, indicating that the application of the full ability driven teaching can improve students' abilities in all aspects, as shown in Figure 3.



**Figure 3 Comparison of the abilities of full ability driven teaching class and conventional class**

Comparison of students' experimental results: the experimental results of the full ability driven teaching and the parallel class of conventional teaching were compared. The overall average score of the full ability driven teaching class was higher than that of the parallel control class of conventional teaching, indicating that the full ability driven teaching mode can stimulate students' interest in learning and improve their academic performance.



**Figure 4 performance comparison between full ability driven teaching and conventional teaching**

## 4. Conclusion

Based on the reform of the full ability driven teaching mode of pharmaceutical chemistry experiment course under professional certification, the ability training in all aspects is penetrated into all links of teaching evaluation, and the students' curriculum learning ability, practical operation ability, design innovation ability, team cooperation ability, problem analysis ability, problem solving ability and communication ability are stimulated and cultivated, So that pharmacy students can get comprehensive development in many aspects, such as basic knowledge, experimental skills, interpersonal communication and innovative thinking, and make contributions to the cultivation of high-quality, innovative and full ability pharmaceutical talents for China's pharmaceutical industry.

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