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The Exploration and Application of PI in the Course of Natural Medicinal Chemistry

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Abstract: PI is a problem-based autonomous,discussion,inquiry teaching method,which can improve learning autonomy and enhance learning effect[1],and is also one of the teaching methods with certain influence in the international teaching field.Based on the curriculum characteristics of natural medicinal chemistry,PI is applied to its teaching,and a new teaching mode based on PI is attempted to be established,hoping to improve the teaching quality of core professional courses,cultivate medical talents with solid professional foundation and high comprehensive quality,and provide guarantee for the development of pharmacy.

Keywords: PI;Natural medicinal chemistry;Exploration and application

Natural medicinal chemistry is a subject that uses modern scientific theories and technologies to study the structural characteristics,physicochemical properties,extraction and separation methods,structural identification,biological activity and biosynthetic pathways of chemical components in natural medicines,and is an important core professional course for students majoring in pharmacy.The purpose is to train students'ability to engage in the research,production,and guiding clinical medication. The theoretical content of natural medicinal chemistry course is complex,with a large amount of information and many knowledge points to master.Based on the poor foundation of Advanced Placement(organic chemistry,analytical chemistry,etc.),students have weak ability to analyze and solve problems through comprehensive application of the knowledge in the course,poor learning initiative and a fear of difficulties,resulting in poor learning effect.Therefore,PI(Peer Instruction)is introduced into the teaching to build an innovative teaching mode with student-centered,student-student interaction,teacher-student interaction,independent learning and discussion learning as the main forms,and with the aim of cultivating high-quality and all-round pharmaceutical talents.

1. The Overview of PI

PI(Peer Instruction,also known as"peer teaching method")was founded by Eric Mazur,a famous professor at Harvard University[2]. This teaching method is a problem-based cooperative exploration between independent learning and students,which changes the traditional classroom teaching mode.The inquiry,interactive and discussion teaching mode effectively cultivates students'ability of independent learning and innovative thinking,and guides students to stimulate their internal learning motivation through teamwork. And finally,the harmonious development is achieved among students'cognition,thinking,emotion and will.PI can effectively cultivate students'critical thinking and divergent thinking,enhance students'problem-solving and decision-making ability,and has been widely used in multi-disciplinary teaching in recent years.

PI advocates students as the main body and teachers as the leader in the teaching process.Teachers carefully design teaching content,optimize teaching links,set questions,and guide students to consciously carry out independent exploration and cooperative learning.The core of PI is to conduct student-student interaction and teacher-student interaction under the guidance of Concept Tests,and guide students to learn independently.PI reduces the teacher's"duck-stuffing"type of teaching in the traditional classroom,and improves the participation and activity of students in classroom teaching.

2. The Teaching Process of PI

PI organizes teaching around core concepts based on effective pre-class task of students.The teacher makes the outline of the

course content before class,and divides the teaching content into different units,each of which revolves around a core knowledge point,and requires students to preview the corresponding chapters before class and complete the pre-class quiz.

In class teaching,students are tested on the basis of the teacher's elaboration of knowledge points.The teacher explains not only the key points in the course content,but also the difficult points and the cases,so as to deepen the students'understanding of the teaching content.Secondly,in the course of explaining,the teacher should control the teaching progress according to the learning situation.For example,after each knowledge point is explained in detail,students will be tested accordingly,and if the majority of students choose the correct answer in the concept test,the teacher will immediately move on to the next knowledge point.If the percentage of students who choose the correct answer is too low(say less than 30%),the topic should be explained again,and then the students'mastery of the topic is assessed again by a test.

3. The Teaching Effect of PI

PI asks teachers to focus on the core knowledge points of the course to teach,and prepare the thinking questions and classroom test questions before class.And Teachers can teach purposefully according to students answers that can timely feedback their understanding and mastery of the concepts.Compared with the traditional teaching mode,the inter-group discussion and the targeted guidance from teachers in PI further help students to deepen the mastery of knowledge points.It realizes the"student-centered,teacher-led"student-student interaction and teacher-student interaction before class,during class,and after class,and builds a positive,open and interactive learning environment.

4. The Applied Practice of PI in the Course of Natural Medicinal Chemistry

4.1 An analysis of the learning situation of the course of natural medicinal chemistry

Natural Medicinal Chemistry is the core course in the first semester of the third year of pharmacy major.Students at this stage have learned inorganic chemistry,analytical chemistry,organic chemistry and other professional courses,and have a certain professional knowledge framework and theoretical foundation.When learning about the structural classification,physicochemical properties,and other aspects of natural medicinal chemistry,they have a good enthusiasm and initiative in learning,but they have forgotten some knowledge.For the knowledge difficulties in the course,such as separation and purification,structural research,etc.,students show a decrease in interest,passive learning,and a fear of difficulty.

4.2 The practice of blended teaching mode of PI in the course of natural medicinal chemistry

In the preparation process of using PI to teach,firstly,according to the requirements of teaching syllabus and teaching objectives,teachers should clarify the teaching ideas and implementation steps,select important knowledge points,and sort out the outline of the lecture according to the knowledge points.

Taking the physicochemical properties of flavonoids in Section 3 of the sixth chapter of"Natural Medicinal Chemistry"as an example,this part explains the basic knowledge of physicochemical properties of flavonoids,including character,color,solubility,optical activity,acidity and alkaline and identification reaction.According to the basic requirements of PI,we take teaching design with teaching duration of 40 minutes as an example:

The steps of implementation include:The first step is pre-class preview.Teachers arrange preview content in advance on the platform of Chaoxing Xuexitong,and students complete learning tasks from demonstration videos about the"physicochemical properties of flavonoids"on the MOOC platform.The second step is to integrate the PI into the classroom teaching:(1)Pre-class learning test(the content mainly involves basic knowledge)is carried out on the Chaoxing platform,the questions are objective single-choices to detect the preview situation,and the teacher analyzes the correct rate of answers in the management side of the platform;(2)Group cooperation:5 students work together to solve problems with a correct rate of 30%~70%.Teachers will explain difficult points with a correct rate of less than 30%,and provide similar questions for students to answer again;(3)Teachers can use the Chaoxing platform to do classroom tests,and analyze students'grasp of the difficult points of physicochemical properties of flavonoids according to the test results,and analyze the accuracy rate again;(4)Higher-order tasks:if the main difficult points have been solved,they can learn the application of the acidity and identification of flavonoids.The teacher will provide topics(When comparing the acidity of flavonoids with anthraquinone and coumarin,what is the difference in the principle of using alkali soluble acid precipitation method?The problem can gradually deepen from shallow to deep).Students collaborate to solve and share solutions.The third step is to review after class to consolidate and expand the scope of knowledge about flavonoid.Teacher assigns reading and sharing tasks,and students collaborate to complete them and then submit them.

In the process of using PI to teach,all students are required to participate into it,including thinking question,sending answers,group discussion,conclusion formation,explanation and comment,etc.Group discussion improves students'learning enthusiasm and

initiative,stimulates students'learning interest,and creates a better learning atmosphere.The teacher guides the students properly in the discussion,and guides the students to finally reach the correct conclusion.It's Better to Teach Fishing than to Offer Fish. Meanwhile,the application of PI should be timely and moderate;In the chapter teaching of Natural Medicinal Chemistry,we will choose alkaloids,flavonoids,terpenoids and volatile oils and other chapters to apply PI.In the process of implementing PI in the course,the performance that students complete pre-class preview will be included in the score of student group,and those who are recognized by teachers and classmates may receive additional points;In the classroom test,the top 5 students in the three chapters will be given additional points,and additional points of each chapter are accumulated,with only points added and no points deducted.After class,students who carefully complete the expanded reading and have good insights will be given additional points as appropriate. This kind of positive motivation can effectively stimulate students'learning interest and learning initiative,and promote students'deep learning;As the basis for evaluating grades in daily life,process evaluation can more objectively and reasonably reflect the learning process of students.

Conclusion

In the practical application of PI in the course of Natural Medicinal Chemistry,its advantages are mainly reflected in:improving the teaching quality of professional courses(helping students deepen their understanding of knowledge and absorb knowledge,stimulating their learning enthusiasm,and improving their final test scores),cultivating students'innovative thinking and scientific literacy(effectively promoting independent learning,stimulating innovative thinking,training scientific reasoning and logical thinking),enriching the evaluation basis of students'normal performance and laying a foundation for exploring models for training practical,innovative,and entrepreneurial talents.

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