

 <p>ISSN NO. 2320-5407</p>	<p>Journal Homepage: -www.journalijar.com</p> <h2>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)</h2> <p>Article DOI:10.21474/IJAR01/8219 DOI URL: http://dx.doi.org/10.21474/IJAR01/8219</p>	
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RESEARCH ARTICLE

TEACHING MODEL DESIGN OF ENZYME ENGINEERING COURSE BASED ON MIND MAPPING.

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Manuscript Info

Manuscript History

Received: 16 October 2018

Final Accepted: 18 November 2018

Published: December 2018

Key words:-

Enzyme engineering, Mind Mapping,
Teaching Model, Teaching reformation.

Abstract

Mind map, as a kind of divergent thinking map that guides and records the thinking process, can guide students to explore their own thinking network. The application of mind mapping to students' preview, group discussion, teacher-student interaction and other teaching links can significantly improve the teaching quality and teaching effect. This paper analyzed how to design the teaching model of enzyme engineering based on mind mapping.

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Introduction:-

Mind map, proposed by British Buzan Tony in the 1960s, starts with a subject and classifies the information related to each other, gradually establishes an orderly divergent mind map that guides and records the process of thinking^[4]. It is widely used in our life, study and work because of its radioactive thinking ability and multi-sensory learning characteristics^[3]. Classroom teaching is the fulcrum of education system and the key and core of the talent training model. Therefore, exploring the high-efficient teaching pattern is the core of education reform. Efficient classrooms are the unification of teaching and learning to achieve high efficiency. In this process, students can experience the fun of learning while improving their knowledge. In addition, students can cultivate their emotional attitudes and values in the process of autonomy, cooperation and exploration. Enzyme engineering is the core course of biotechnology major, which is formed by the cross-penetration of enzymology, microbiology and engineering. Together with genetic engineering, cell engineering, fermentation engineering and protein engineering, it constitutes a modern biotechnology system^[1]. As an interdisciplinary technical discipline, enzyme engineering has a complex content, strong practicality and rapid update, it is very difficult to make students to be proficient in knowledge with the traditional teaching mode. Therefore, the teaching mode of thinking guide map is designed to improve students' ability of understanding knowledge and thinking. At the same time, this kind of teaching mode also gives the class time back to the students.

Design of teaching program:-

Aiming at the core part of the teaching system, the classroom teaching with the mainline of mind map is oriented by the questions set by the teacher. The teaching plan of "pre-class preparation + group discussion + teacher-student interaction+ teacher-student summary+ after-class application" is designed through group discussion.

Pre-class preparation: Students think about the brief mind map and problems on the learning task list through independent reading and micro class learning. One of the advantages of this pre-class preparation is to set up the knowledge framework for students in advance and guide them to think actively. Moreover, the teaching of basic knowledge is transferred from class to class, which not only saves time in class but also exercises students'

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independent learning ability. Generally speaking, this is in line with the new educational view that "students are learning subjects".

Group discussion: In view of the content of pre-class preparation, students discuss with teachers to solve their doubts and deepen their understanding and reflection on knowledge. In addition to improving students' language expression and thinking ability, this method of discussion can also cultivate students' ability to cooperate. The collision of students' different thinking will change their perspective of looking at problems. In turn, the limitations of thinking will be broken. This is very helpful to cultivate the awareness of innovation.

Teacher-student interaction: The students fill in the thinking diagram of the teacher's blackboard book. Then the teacher explains and answers questions with the blackboard book filled by the students as the main line. For the key knowledge points, teachers should guide students to connect with the academic frontier. Under the tide of curriculum reform, teachers should free themselves from the role of knowledge giver in the past and actively become the promoter of students' learning. In the process of teacher-student interaction, students and teachers conduct knowledge docking through mind mapping to strengthen students' understanding of basic knowledge. At this stage, teachers should make breakthrough explanations of important and difficult knowledge and guide students to pay attention to academic frontier problems.

Teacher-student summary: The main line of thinking guide map is used to extract and summarize what has been learned and explore deep-level academic problems. The process of reading and learning is actually the process of making books thinner and thinner. Through pre-class preparation and discussion, students' understanding of the knowledge points in the textbook has changed from vague to clear, but a complete knowledge system has not been formed. The process of teachers and students summarizing together is the process of abandoning, leaving out the details and leaving the most core framework to form a mind map.

After-class application: The mind maps that students draw with their own understanding after-class can guide them to solve the related problems and deepen their understanding of knowledge. In view of the academic problems that students are interested in, teachers encourage students to read literature to write research projects or participate in various entrepreneurial projects of college students, so as to improve their ability of linking the theory with practice through scientific research innovation.

Mind map teaching should pay attention to the problems;-

Although the teaching mode of mind mapping can improve the teaching quality of teachers and the learning effect of students, it is necessary to pay special attention to some matters in the process of practical application.

First of all, teachers should always supervise and adjust the implementation process of the whole teaching design. The reason for the constant supervision is that this teaching mode is mainly based on student activities. However, most students in China have grown up under the traditional teaching mode and are less active in learning. Teachers must constantly supervise and implement appropriate reward and punishment system to encourage students to participate actively in it; Because there is no teaching mode that is applicable to all classroom teaching. Teachers should adjust the teaching plan according to specific situations, especially in the stage of before-class preparation. Teachers must let students complete the preparation work efficiently, because the role of teachers in the classroom is not only the initiator of knowledge, but also the guidance of thinking. If the students do not have a general understanding of the knowledge before class, the teaching efficiency of the classroom will be greatly reduced.

Secondly, Not only can mind mapping be done with software but it can also be done by hand. Both methods have their own advantages and disadvantages. For example, compared with hand-drawing, it saves time and effort to draw with software, and it is also convenient to change the drawing. But for hand-drawn drawings, it does not require an electronic device to complete the drawing. Teachers can let students choose their own drawing methods. The software for making mind maps is generally XMind, MindManager, FreeMind, etc.

Again, before group activities, teachers must clearly put forward the content and requirements of this activity. Let the students know what to do, and ask the students to listen carefully to the requirements before they can start activities. Otherwise, students blindly sit together without clear requirements, affecting the effectiveness of cooperative learning. During the process of the group discussion, teachers should actively participate in it, pay attention to students' thinking trends, and guide students to think.

Finally, the evaluation system needs to be matched. For the final examination, the scoring principle of 50% of the usual performance (20% of the class situation, 30% of the mind map completion) + 50% of the final exam can be adopted. The scoring of the mind map of other groups greatly promoted the enthusiasm of the students in making the mind map and cultivated their ability of objective evaluation. It is helpful to change the traditional evaluation system so that students' achievements can be evaluated more fairly, which helps to mobilize students' initiative.

Conclusion:-

As the basic core course of biotechnology, enzyme engineering has strong practicality and rapid renewal, which is suitable for classroom reform under the new curriculum standards. Based on mind mapping, the teaching mode of Enzyme Engineering is applied to the whole teaching links such as pre-class preparation, group discussion, teacher-student interaction and summary. Students can simplify and organize the complicated contents and establish a clear thinking mode by enhancing their ability to hold the whole in a large and complicated group of knowledge. This teaching mode can not only improve students' interest and autonomy in learning^[2], but also develop students' ability of logical thinking, interest in learning and cooperation communication skills. In addition to the ability to grasp the key points and key points as soon as possible for complex problems, the application of mind mapping in teaching has also formed a unique teaching model, which provides new ideas for educational reform in colleges and universities.

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