# **Exploration of Interactive Teaching Methods in Teaching Microbiology**

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**Abstract:** Microbiology is a compulsory course for biology majors, which mainly focuses on the different forms, growth changes, characteristics, and mutation processes of microorganisms, etc. The theoretical knowledge of microbiology is relatively large, which not only requires students to sort out and memorize a large number of knowledge points under the classroom, but also needs to be actively involved in the classroom to understand the knowledge content in-depth, but the classroom use of the traditional way of teaching such a huge Knowledge system is more difficult, this paper to microbiology teaching interactive teaching method investigation as a research direction, the purpose is to explore the reasonable application of interactive teaching method in microbiology teaching, to promote the sustainable development of interactive teaching, for the majority of teachers to provide reference and reference.

Keywords: Microbiology; Teaching; Interactive teaching

DOI: 10.62639/sspjiess05.20240105

# **1. Introduction**

The rapid development of the field of education, interactive teaching method in the teaching of various disciplines has been widely used, the traditional microbiology teaching theory knowledge teaching accounted for a large proportion of students to receive knowledge in a limited way, but this course not only need students to master the theoretical level of content, but also need to have hands-on ability in order to better understand the microbiological technology. Interactive teaching method was born in this context, the method focuses on the connection and communication between teachers and students, students can be in the classroom through group discussion, practical operation, case study, simulation experiments and other ways to strengthen the sense of classroom participation and experience. Interactive teaching on the one hand can enhance students' interest in microbiology knowledge, on the other hand, it can also effectively exercise their ability to find problems and solve problems. For example, in the classroom, teachers can use the experimental interaction to guide students to design the experimental program, after the experimental operation and analysis of the results, so that students can experience the fun of practice, and recognize the growth of microorganisms and metabolic processes. In short, interactive teaching methods in microbiology teaching classroom for reasonable use, not only can improve the quality of teaching, but also for the cultivation of innovative ability and practical skills to lay the foundation for complex talents.

# 2. The Value of Applying Interactive Pedagogy in Teaching Microbiology

## (1) Facilitating the attraction of students' attention

Interactive teaching methods are richer, including theme exploration, selected cases, discursive interaction and generalization of the problem of interaction, and whichever method to learn to students and teachers

#### (Manuscript NO.: JIESS-24-5-F001)

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to participate in the classroom in order to achieve the desired teaching results, for example, the teacher in the use of the theme of the exploration of the teaching method, you need to do a good job of preparation work in advance of the class, to develop a clear interactive theme, which is a higher demand on the teacher's professional competence. Teachers can only be more familiar with the interactive process in the classroom if they have done enough pre-course preparation, and the fluency of the classroom will be improved accordingly. The knowledge of microbiology is complex and logical, the traditional lecture method will make students feel boring and uninteresting, while the interactive teaching method can mobilize students' enthusiasm, make them more focused on the classroom, and guide them to be interested in the knowledge, which will make students' motivation to learn more smoothly.

#### (2) Enhancing students' understanding of content

Microbiology course content for some students is obscure and difficult to understand, especially in the theoretical knowledge, students understand more difficult, the traditional teaching methods can only complete the teaching tasks set by the teacher to meet the teaching progress of the advancement, but ignored the students' understanding of the knowledge and the ability to use it, in the long run, the students' interest in the course declined, the practical ability can not be cultivated. Interactive teaching methods can make the classroom atmosphere more active, the use of interactive questions and answers, discussion, set up problems, etc., conducive to students according to the problem and the discussion of association and thinking, and guide the students to actively communicate with their peers or teachers, so that students are good at discovering the problem, understanding the problem, thinking about the problem and ultimately solving the problem, so that they can better think about the content of the teaching and learning, understanding of the knowledge and the rational use of the content.

## 3. Problems of Applying Interactive Teaching Method in Teaching Microbiology

## (1) Difficulty in capturing students' points of interest

Some students feel dull and boring when learning microbiology, and teachers need to find out what students are interested in during the preparation stage and present them in the classroom, so as to enhance students' interest, which puts forward higher requirements for teachers' qualities, but since students' personalities are different, and thus their interest in knowledge varies, it is difficult for teachers to take care of the interest of all students, which poses a Some teachers choose to ignore students' individual learning needs and instead teach with fixed content, resulting in low motivation for student interaction.

## (2) Interactive teaching affects teaching progress

Microbiology is a discipline of biological research, relative to the humanities, microbiology in teaching involves experimental activities, etc., teachers need to do a good job in the classroom before the design, preparation of instruments and equipment, but in the teaching process of experiments need to consume a certain amount of classroom time, and then interact with the students will occupy a limited amount of classroom time, the teacher needs to be in the specified time to complete the teaching task, interactive teaching to ensure the efficiency while ensuring the quality of teaching, the teacher should strengthen the control of this. efficiency while ensuring the quality of teachers should strengthen control.

#### (3) Difficulty in securing student participation

The core of interactive teaching lies in the two-way communication and cooperation between teachers and students, but in the actual microbiology classroom student participation is not balanced, some students in the classroom interaction is active, willing to speak and participate in the experimental operation, while the other

part of the students due to introversion, lack of self-confidence, or weak knowledge base, choose to be silent or passive participation, this imbalance in the participation of the situation makes it difficult for teachers to comprehensively assess the learning effect and knowledge mastery of each student. This uneven participation makes it difficult for teachers to comprehensively assess the learning effect and knowledge mastery of each student, especially in the case of a large class size, the classroom is more difficult to ensure the interactive participation of students, therefore, the students in the classroom to get exercise and understanding of the degree of different, in order to enhance the participation of students in the tragic teachers need to design a wealth of interactive methods, and also to focus on the

Designing a variety of interactions and focusing on the more introverted students in the classroom, providing more guidance and encouragement to help them integrate into the classroom activities, place higher demands on the teacher's teaching skills and classroom management abilities.

#### (4) Limited interactive teaching resources and laboratory facilities

Microbiology is a discipline that is highly dependent on experimentation and practice, and the effective implementation of interactive pedagogy usually needs to rely on advanced laboratory equipment, abundant teaching resources and reasonable laboratory space. However, many colleges and universities have deficiencies in resource allocation, with outdated laboratory equipment and lack of experimental materials, and even in some schools with relatively weak infrastructures, it is difficult for students to carry out adequate experimental operations and practical activities. This not only affects the effect of interactive teaching, but also may lead to students not being able to obtain real and profound experience in the experimental process. In addition, the pre-course preparations and experimental materials required for interactive teaching are costly, and some schools and teachers may not be able to make adequate preparations with limited teaching funds. All these factors limit the full promotion and in-depth application of interactive teaching in microbiology teaching. Therefore, how to rationally deploy teaching facilities and materials to optimize the implementation of interactive teaching under limited resources is a realistic problem that needs to be solved in microbiology teaching at present.

# 4. The Application of Interactive Teaching Method Strategy in Microbiology Teaching

## (1) Understanding students' interests

In order to meet the learning interests of different students, teachers need to enhance the flexibility of teaching design and adopt the strategy of personalized interaction to enhance students' learning motivation, which requires teachers to fully understand the students' personality characteristics, learning background and knowledge base, and conduct a full investigation in the preparation stage, using classroom discussions, individual communication and other ways to understand which teaching topics or teaching modules of microbiology are more interesting to students, for example, some students are more curious about the process of microbial mutation, while others are more interested in microbial experiments. For example, some students are more curious about the process of microbial mutation, while others are more interested in microbial experiments to the teaching content during the preparation of lessons according to the individual needs of the students, so as to make the interactive links more attractive, for example, before the end of each lesson, the students in the class vote to decide the form of classroom interaction for the next lesson, in order to understand the students' classroom interaction for the next class, so as to know the students' demand for classroom interaction.

In the teaching process, teachers can introduce hot issues of current affairs, related to the students' real life to trigger student discussions, microbial knowledge and students around the things to link, to strengthen

students' knowledge and interest, for example, microorganisms and food deterioration, food poisoning and other hot issues associated with the students to actively discuss, enhance student participation in the classroom, and at the same time pay attention to the current hot topic of social issues so that they can acquire More life skills and general knowledge. Teachers can also use advanced digital equipment to demonstrate microbial three-dimensional simulation for students, so that students can recognize different types of microorganisms, enhance classroom interactivity and make the boring classroom more vivid and intuitive. Teachers can also provide students with more opportunities for discussion and learning, to provide different subject groups, so that students in the classroom independent team, the formation of experimental groups, to complete different microbiological experiments, for example, the use of students' lives in the common milk spoilage and yogurt fermentation experiments to differentiate between fungi and bacteria, in order to enhance student thinking and discussion, through the cooperation of members of the group hands-on, observation, experimental exploration and discussion of answers, etc., to enhance classroom interaction and make the boring classroom more intuitive. Through the cooperation of group members in hands-on operation, observation, experimental exploration and discussion of answers, and ultimately linked to the knowledge points in the textbook, so as to strengthen students' knowledge and memory, broaden students' horizons and enhance their hands-on ability, through a variety of interactions, the teacher not only enhances the students' interest in the subject of microbiology, but also strengthens the sense of participation in the classroom and optimizes the learning effect.

#### (2) Optimizing interactive teaching time management

The timeliness of interactive teaching plays a certain impact on the quality of classroom teaching, teachers need to carry out scientific planning and fine arrangement in the teaching design link, according to the teaching objectives and the content of the textbook, each teaching task is finely divided, and interactive modules are designed in this content, for example, in the process of teaching experiments, the teacher needs to divide the experiments into different experimental steps, such as the preparation of the materials before the experiment, Experimental operation explanation process, precautions and experimental materials, etc. During this period, teachers need to actively interact with students, can use the form of questioning or discussion to guide students to understand the experimental steps and instrumentation, so that they can fully prepare for the experiment in the classroom introduction stage, to avoid subsequent experimental process of instrumentation or operational problems, and thus shorten the classroom operation time and improve classroom efficiency.

Teachers can use modern technical equipment, use online and offline combination of ways to improve teaching efficiency, for example, before the experimental operation, the use of experimental simulation APP for students to practice in class, in advance, so that students are familiar with the experimental operation, so that in the actual classroom is able to carry out the test more proficiently, and the teacher is also able to online simulation of the experiments of the problems found by the students to carry out the discussions and interactions to guide the students to reasonably solve the operational problems, and then save classroom time. Students can reasonably solve the operational problems, thus saving classroom time, in the classroom discussion can be used in the way of group cooperation, so that students are free to group together to discuss the results of the experiment and the problems found in the experiment, the collection of experimental data to discuss, and in the prescribed time for the class to report, which not only reduces the time of the teacher's single output of knowledge, but also enhances the frequency of student interactions, using group cooperation and interaction to enhance the efficiency of the classroom. interaction to enhance classroom efficiency. In the process of optimizing the interaction time, teachers need to maintain flexibility, make a detailed flow chart before class, reasonably plan the time required for different links, reserve time for discussion and interaction, and make adjustments, if the interaction time of some links is too long, teachers can also use alternate solutions, for example, in the summary session at the end of the classroom, if the students spend too much time on the discussion process, the teacher can appropriately reduce the subsequent Each group reporting and summarizing

time, so as to ensure the efficiency of student interaction and the quality of classroom teaching, while avoiding delays in the teaching progress, so that the classroom teaching objectives can be successfully achieved.

#### (3) Enhancing student participation in the classroom

Microbiology classroom interactive teaching, should ensure that students participate in interaction through a variety of channels, in order to enhance student interest, which requires teachers to provide students with diversified ways to participate in the classroom, such as the use of group cooperative learning, so that students are responsible for a fixed task or step, the use of a clear division of labor and collaboration, the teacher can focus on the more introverted students in the class, which is often a low degree of participation in the classroom Teachers can focus on the more introverted students in the class, who are often less engaged in the classroom and shy to participate in classroom interactions. Teachers should actively guide students to build up their selfconfidence and help them find their own roles in the class, so that they can speak in a relatively small group and get more opportunities to show themselves, which will enhance their sense of participation, and the group cooperation can also be used in the way of inter-group discussions to enhance the opportunities for students to interact and cooperate with each other.

Teachers can fully mobilize students' enthusiasm by setting up different forms of classroom interaction, for example, teachers can combine game-based teaching or competition-based discussion, so that students can participate in the form of competition to answer questions and consolidate knowledge, and stimulate their enthusiasm for classroom participation. For some of the students who participate in the interaction in a passive way or have a weak foundation of knowledge, teachers can set up open-ended questions or provide guiding questions to help them join the discussion more easily. Teachers can use online platforms to provide real-time classroom feedback, allowing students to participate in classroom interaction through anonymous voting, answering questions or leaving messages in the discussion forum, so that even introverted students can actively participate in an anonymous way to avoid the psychological pressure on students caused by public speaking. Teachers should pay attention to personalized guidance in the interactive process, timely understanding of each student's learning progress and the completion of group tasks, teachers can communicate with students one-on-one through post-course feedback, individual interviews, or the use of anonymous letters in the form of anonymous letters, allowing students to put forward the classroom interaction of the proposal, as a means of understanding the classroom interaction of the feelings and needs of the students, and to help them to overcome the psychological barriers to participation, the teacher should also be able to help students to participate in the classroom interaction. In the biology teaching classroom, teachers should also consciously guide those students who usually speak less to express their own views, and give them more encouragement and support, so as to effectively improve student participation to ensure that the classroom interaction is more balanced, and to help each student to find their own way of classroom participation, so as to enhance the overall teaching effect.

## (4) Improving classroom resourcing

In order to enhance the effectiveness of interactive teaching of microbiology in the case of limited classroom resources in schools, teachers need to rationally deploy existing teaching resources in schools and explore innovative interactive methods. Teachers can optimize the experimental design, reduce the reliance on high-end equipment and consumables in experiments, and choose low-cost and high-efficiency experimental materials, so as to ensure that students can still obtain solid experimental experience under limited conditions, for example, teachers can design simple, intuitive experiments and use common experimental equipment for alternative operations to enable students to understand core concepts without relying on expensive equipment. Teachers can also carry out virtual experiments and allow students to operate virtually through simulated experiment APPs and online experimental platforms as a way of supplementing the deficiencies of physical

experiments and helping students to learn and practice through digital means.

In the case of limited funds teachers can also enrich the teaching content by cooperating with external resources, for example, cooperating with other institutions or social enterprises, establishing joint school laboratories or resource exchange mechanisms on campus, so that students can have the opportunity to use more advanced experimental facilities and instruments, teachers can also encourage students to participate in extracurricular projects or internships, the use of social resources to make up for the lack of experimental resources in the school, to Enhance students' practical ability. Schools can actively seek external research funding, government grants and corporate donations in order to enhance the modernization of laboratory facilities. In order to reduce teaching costs and improve the efficiency of resource use, teachers can maximize the use of laboratory materials through careful planning and integration of resources before class. For example, by unifying the arrangement of experimental courses and centralizing the use of experimental consumables to reduce the waste of experimental materials, teachers can adopt the mechanism of secondary use of experimental materials to reuse some durable experimental equipment or reasonably distribute materials that can be shared in different experiments, and teachers themselves can also find solutions in the environment of limited teaching resources through teamwork and experience sharing to develop more teaching objectives in line with low-cost experimental programs.

# 5. Conclusion

In summary, the exploration of interactive teaching methods in microbiology teaching is not only the innovation of teaching methods, but also a key means to enhance students' learning experience and practical ability, through the flexible use of diversified interactive methods, optimize the classroom management and resource allocation, teachers can effectively stimulate students' interest in learning, promote classroom participation, and ensure the quality of teaching. The rational deployment of laboratory facilities and the introduction of modern information technology provide more possibilities for interactive teaching in the case of limited resources, helping students to better understand and master complex microbiology knowledge. Through the continuous innovation and application of interactive teaching concept, this teaching method will play a more important role in microbiology teaching, so as to cultivate excellent talents with practical ability and innovative thinking for the society.

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