Teaching Reform and Practice Exploration of Water Environment Chemistry and Control Technology Based on Computer Technology

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Abstract. Water environmental chemistry is an important part of environmental chemistry teaching, and with global warming, water environmental chemistry teaching can cultivate the awareness of environmental protection, the traditional water environment teaching course is relatively boring, the textbook content is too simple. Based on this, this paper firstly explains the problems existing in the teaching of water environmental chemistry and the advantages of multimedia teaching in the teaching of water environmental chemistry, and then explores them in combination with specific experiments for the reference of readers.

Keywords: Computer Technology, Water Environment Chemistry, Control Technology, Enthusiasm

1. Introduction

With the continuous development of information technology, water environmental chemistry can present text, graphics, images and other information more intuitively and vividly by means of information technology, which enriches the teaching content of water environmental chemistry course and improves students' learning enthusiasm and initiative [1-3]. Therefore, the application of multimedia technology to auxiliary teaching has become a hot spot in universities and promoted the development of water environmental chemistry teaching in universities and colleges.

2. Problems existing in water environmental chemistry teaching

2.1. The content of textbooks is single and some of them are outdated

At present, the following three textbooks are mainly used in teaching aquaculture environmental chemistry courses in aquatic colleges and universities: Freshwater Aquaculture Water Chemistry, edited by Zhanjiang Aquatic College; Hydrochemistry, edited by Chen Jiarong; Environmental Chemistry of Aquaculture water, edited by Lei Yanzhi, L. Among them, the textbook freshwater Aquaculture Water Chemistry, edited by Zhanjiang Aquatic College, has the earliest compilation time, fewer pages, and is simpler and easier to read than the latter two books [4-6]. However, this textbook has been written for a long time, and its content is too simple. Although it is practical, it is out of step...
with the current aquaculture industry, unable to meet the growing knowledge and technology needs of the aquaculture industry, and not suitable for many problems caused by the rapid development of the aquaculture industry. Then 2 textbooks in the original theory based on the complement, but because not every students' theoretical knowledge skills are very good in all the subjects, the textbook knowledge involved 2 are firmly, so only through the 2 textbooks, students can't for the theory knowledge for better absorption, also causes the student to the teaching content of this course the lack of enthusiasm, form teacher difficult to teach, students' difficult situation.

2.2. Weak hands-on ability of the experiment
At present, basically all the hydrochemistry experimental courses are taught by the teacher first to elaborate the theoretical knowledge content, and then to arrange a corresponding experiment to consolidate the previous content. Take the water sample determination experiment as an example. The experiment teacher arranged the students to collect the samples in the vicinity of the school in advance, listened to the teacher's explanation and watched the teacher do the demonstration in class. Then let the students do it by themselves, write an experiment report after class, the teacher will give the grades after reading. Because of the experimental determination of sample is not used by the farmers and enterprises of water samples, lead to the experimental results with the actual situation of fishery production, students do not know the specific water quality indicators used by the production, through the whole experiment process can only learn how to operate and can't grasp how to combining experiment and production practice, the more can't use the learned knowledge to guide the production practice. Causes the student's study state to be passive, cannot achieve the teaching purpose.

2.3. Obsolete equipment
The teaching of aquaculture environmental chemistry should be in line with the rapid change of knowledge and the rapid development of technology. In view of this, the change of experimental curriculum at the same time, should also consider the purchase of advanced equipment, the use of the precise instrument to assist laboratory experiment, because such as atomic absorption spectrophotometer, precision instruments, such as gas chromatograph, liquid chromatograph, carry out the work of teaching and scientific research institutions of higher learning is important material base. The test method should adopt the current domestic standard method, so as to broaden students' horizon and enable them to master new experimental skills.

  At the same time, some measurement methods used in the laboratory are too complicated and relatively backward. Now, for example, farmers don't have to measure oxygen content in water too precisely; As long as the general understanding of the oxygen content in the pool is sufficient, can meet the survival of aquatic products, now the production also generally began to use portable oxygen meter to determine. At present, the determination of ammonia nitrogen, nitrite, hydrogen sulfide, etc., can also be used for rapid determination kit, compared with the traditional determination method, more rapid and simple.

3. The advantages of multimedia teaching in the teaching of water environmental chemistry

3.1. Multimedia teaching is helpful to improve students' learning initiative and enthusiasm
In the traditional way of teaching, teachers mainly explain abstract and boring theories through textbooks, chalks, blackboards and other means. This is often not easy to be accepted by students, teachers and students in teaching activities cannot communicate well, forming a group determined and one-way teaching mode. Multimedia teaching is mainly through computer, TELEVISION, slide projector and other audio-visual equipment, a comprehensive integration of slide, projection, sound recording, video recording, computer characteristics, to achieve the circle, text, sound, dynamic and static combination, so that the original boring classroom becomes vivid and lively. For example, in the teaching content of "water environmental chemistry" chapter, through the slide show for nearly a Zhanjiang, river, lake and sea suffered serious pollution of images, in particular to the mother river,
the Yangtze river discharges a large amount of industrial wastewater killed a large number of fish and shrimp night image contrast and Yunnan dianchi lake pollution water environmental quality before and after pictures, let the students deep understanding to the water environment pollution hazard has been very serious, greatly inspired them to study hard for the environmental protection in China and the initiative and enthusiasm. Open the Internet web page for students to understand the progress of the drought in a timely and intuitive manner, which not only cultivates students' good quality of loving the motherland and caring for the elders of their hometown, but also improves students' understanding of water shortage, which is incomparable to any burst of figures. After class, a student from the disaster area in Yunnan province said with tears in her eyes that she would never forget the scene of drought in her hometown and that she must learn knowledge well to protect water resources (Figure 1. White garbage pollution of the sea).

![Image](image.png)

**Figure 1.** White garbage pollutes the ocean.

3.2. **Multimedia teaching is helpful to increase classroom capacity and improve teachers' teaching efficiency**  
The traditional teaching method, blackboard writing, due to the slow manual writing speed, especially drawing often takes a long time, restricts the classroom teaching progress and reduces the classroom capacity to a certain extent. And the use of multimedia technology can be according to the need to advance the teaching content stored in the computer, can use computer multimedia technology in the classroom knowledge of high density, increase classroom capacity, data show that multimedia teaching can save nearly 30% of teaching hours, due to shorten the teaching time, multimedia teaching can focus on the emphases and difficulties of inspiration, research and discussion, which is helpful to improve the efficiency of classroom teaching.

3.3. **Multimedia teaching is conducive to improving the quality of teachers and their ability structure**  
The application of multimedia teaching will greatly promote the improvement of teachers' comprehensive quality. First of all, the multimedia teaching for teachers to create a new platform for the challenging work, encourage teachers to adapt to new teaching methods and consciously and actively use their spare time to learn to extend relevant knowledge, to update the original knowledge structure, broaden the knowledge of computer application, in particular, and thus contribute to the improvement of the ability structure of teachers, improve teacher's quality. Secondly, in the course of courseware making, teachers are bound to learn excellent courseware and high-quality courseware of other universities and other teachers through the Internet, which undoubtedly greatly enrich and improve teachers' knowledge quality and perfect teachers' ability structure. The author has learned the relevant environmental chemistry courseware for reference and learning many times in the teaching, which is difficult to achieve in the traditional teaching method.
4. Multimedia teaching of water environmental chemistry

4.1. Curriculum design
The total class hours of water environmental chemistry and control technology are 10 hours. Including theory teaching, classroom discussion and practice teaching three main teaching links.

Table 1. Class time allocation of water environmental chemistry and control technology.

| Category            | Teaching content                      | Class hours |
|---------------------|---------------------------------------|-------------|
| Theory Course       | Our water environment                 | 2           |
| Practice class      | Teaching practice of aquaculture farm | 6           |
| Discussion class    | Student reports and discussions       | 2           |

4.2. Design and practice of seminar teaching mode

4.2.1. Teaching design
The course of water environmental chemistry and Control technology adopts the teaching method of "teaching, discussion and practice". Through theoretical teaching, students can master the basic concepts, basic theories and laws of the course and understand the development status of this field. Course discussion: topic 1 literature review 1 course paper writing - PPT making - class report - interactive discussion - the basic procedure of teacher comments. In other words, students are allowed to discuss scientific issues together around the course contents of "self-selection, self-compilation and self-performance", so as to enhance students' participation and stimulate students' interest in learning. The practice course strengthens the combination of theory and aquaculture production practice to test the graduate students' mastery of theoretical knowledge and practical application level.

4.2.2. Organization and implementation process of discussion-based teaching
Divide the students into groups. Teachers divide students into groups before class and set up groups to discuss WeChat groups. According to the total number of teaching classes, the number of each discussion study group should be controlled at 1-3 persons, and the total number of classes below 10 persons should not be divided into groups.

Assign topics. Teachers provide topic selection guidelines in advance on the teaching platform. Graduate students can also choose their own topics around the course content. For example, teachers' topic selection in 2019:

1) analysis of typical water pollution accidents in 2017/2018 (pollution sources, main components of pollutants, impacts of pollution on the environment and losses caused by pollution).
2) The current situation and countermeasures of Marine environmental pollution in China in 2017/2018 (explain the current situation with data analysis, summarize the countermeasures of scholars, and put forward your suggestions).
3) Current situation and countermeasures of Water pollution in Rivers and lakes in China in 2017/2018.
4) Regulation of water use in aquaculture (regulation significance, physical, chemical and biological regulation techniques and methods, suggestions for problems).

4.3. Construction of Internet-based teaching resources
The construction of teaching resources based on The Internet is the foundation of developing discussion-based teaching. The course of water Environment Chemistry and Control technology adopts choosing Xueyin online open teaching platform, which has the functions of creating courses, uploading course teaching resources, issuing teaching notices, pushing assignments, organizing
examinations, carrying out course discussions, organizing teaching management, broadcasting courses and teaching information statistics, etc. The construction of high-quality online course teaching resources is the guarantee of carrying out online and offline teaching. Course teaching resources include

Basic teaching resources and expanded teaching resources. The course of water environment chemistry and Control technology has been online and the basic teaching resources mainly include teaching outline, examination outline, lecture video, homework bank and test question bank, PPT courseware, etc. The expanded teaching resources mainly include: related videos, pictures and animations, references, complex thinking questions, course forums, lectures on hot topics of the course, etc.

4.4. Course assessment method
The course of water environment chemistry and Control technology reforms the traditional single examination course assessment method, and establishes a diversified course assessment and student academic evaluation system covering the usual learning process, course paper, course discussion, final exam and other links. The course grade includes classroom study grade (60%), extracurricular study grade (20%) and course platform study grade (20%).

Table 2. Assessment methods and grade composition of water environmental chemistry and control technology course.

| learning style       | Accounting for the Total Score (%) | Assessment content          |
|----------------------|------------------------------------|-----------------------------|
| E-learning           | 20                                 | Finish homework online      |
| Out-of-class Activities | 20                              | Making ppt                  |
| Classroom learning   | 60                                 | final exam                  |

4.5. Teaching effect
In 2019, seven graduate students took this course as elective courses. The viewing rate of teaching videos on the online platform was 100%, the completion rate of homework was 100%, and 163 people participated in interactive discussions online. Completed 7 course papers, one of which was published in relevant academic journals, and 2 students were approved to be selected as the subject of the course papers by the university graduate innovative experimental project.

5. Conclusion
To sum up, through the use of information technology, water environment chemistry teaching enables students to better accept knowledge, change their learning enthusiasm from passive acceptance to active learning, improve their creativity and problem-solving ability, and promote the cultivation of innovative and practical high-quality students. Therefore, college teaching should make full use of many media tools to promote the development of water environmental chemistry teaching.

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