

Discussion on the Flipped Classroom Teaching Mode of the Water Conservancy Engineering Construction Course

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Abstract: *In the context of digital media, education and teaching reform urgently need innovation, which has become one of the hotspots of current university research. This article refers to the course "Water Conservancy Engineering Construction" and analyzes the advantages and disadvantages of traditional teaching mode and flipped classroom teaching mode against the background of information on the internet. It proposes the plan and arrangement of water conservancy engineering construction courses based on the flipped classroom model in the context of the internet. The results indicate that the application of this model can greatly improve students' satisfaction and increase their learning enthusiasm. This study provides new ideas for the flipped classroom teaching model.*

Keywords: *Internet-flipped classroom; teaching mode; Water conservancy engineering construction*

1. Introduction

With the continuous and profound reform of China's education industry, a new situation has evolved: a comprehensive, wide-ranging, and multi-level multi-grid form. The education form based on the background of the Internet has become the top priority of education and teaching reform in many universities. In addition, the country is vigorously promoting the creation of national first-class universities and disciplines, leading to the phenomenon of internet fever in major universities^[1]. The course in water conservancy engineering construction is a discipline that studies the construction and management methods of water conservancy engineering construction. It is a major professional course offered for water conservancy engineering majors. Including introduction, diversion, and closure engineering construction, blasting engineering construction, foundation treatment and foundation engineering construction, earth rock dam engineering construction, concrete dam engineering construction, sluice engineering construction, aqueduct engineering construction, underground engineering construction, construction organization and plan, construction project bidding and tendering, construction project management, and system, which are the core courses of water conservancy and hydropower engineering. Understanding scientific research and project management related to water conservancy engineering are closely related. Therefore, this course is not only an important course for water conservancy colleges but also a compulsory course for water conservancy and hydropower engineering majors, playing a crucial role. However, traditional classroom teaching is often relatively simple, with textbooks as the main focus. Teaching effectiveness and training. There is a significant gap in nurturing goals, and students' mastery of knowledge is limited to rote memorization, making it difficult to apply the knowledge they have learned to solve practical problems. A flipped classroom subverts the traditional teaching mode of students learning knowledge in class and completing homework outside of class, forming a student. A teaching model that integrates resource learning before class, interactive problem-solving between teachers and students during class, and consolidation and expansion after class

Often, there is a lack of interaction between teachers and students and only unilateral transmission, that is, the transmission process of knowledge from teachers to students. The teaching methods are more restricted, and the channels are relatively single. In addition, there is a significant difference in the development plan, teaching tasks, and execution process, and students tend to focus on theoretical knowledge, making it difficult to flexibly apply knowledge to practical engineering, resulting in a phenomenon of high vision but low skill.

A "flipped classroom is a process of rearranging the knowledge learned by traditional students in the

classroom with homework after class, forming a new model that integrates preview, classroom interaction, and review, greatly enhancing students' initiative and subjective initiative^[2]. This model not only cleverly avoids the rigidity of traditional education models but also promotes students' enthusiasm and improves interaction and communication between teachers and students. Therefore, this article utilizes an online platform to combine flipped classrooms with water conservancy construction courses, exploring a new educational model and providing more ideas for educational reform in the water conservancy industry.

2. The Advantages and Disadvantages of Traditional Teaching Mode in the Water Conservancy Engineering Construction Course

The teaching of water conservancy engineering construction courses is beneficial for teachers to play a leading role in traditional teaching processes, avoid students blindly finding directions, and save a lot of time and energy. In addition, it is conducive to coordination between teachers and students, facilitates management and communication, and merges emotional changes in the process of knowledge transfer between teachers and students. However, there are certainly many problems with the traditional curriculum model of water conservancy engineering construction: First, the teacher is too dominant in the traditional teaching process, resulting in a serious lack of subjective initiative and passive learning among students, which may lead to a significant problem of learning enthusiasm. Students rely too much on the teacher, blindly believe, listen to the wind as the wind, listen to the rain as the rain, have less interaction, lack the idea of "refutation", and the classroom atmosphere is relatively quiet. Secondly, there is a mismatch between the teaching plan and tasks formulated by the teacher and the students' thinking. The teacher may not have taken into account the students' acceptance of knowledge explanations, and the students' thinking abilities may vary. When there is a contradiction between the amount of content and the number of class hours, or when the teacher stops at a crossroads, they cannot invest a lot of time in tutoring backward students. This is unfair to eager students, which will lead to a mismatch in teaching objectives. This is not only a teaching error but also a model error. Thirdly, the teaching plan formulated by the teacher largely determines students' interest in this course, which in turn affects the course's grades. Water conservancy engineering construction courses are easy to understand, but they often have high vision but low skill, only understanding and not connecting with reality. Therefore, students will only memorize, not use, knowledge for themselves and not solve practical problems. Fourthly, the traditional teaching mode has many limitations and cannot adapt to the development of the information and internet eras. The traditional mode emphasizes the teacher as the main body, thus ignoring students' feelings and feedback. It cannot be limited to single-item knowledge transmission, and more students need to actively communicate and interact with the teacher. In summary, how can traditional models be reformed? How to carry out reforms? What model will be used for reform? Becoming the top priority.

3. The Connotation and Advantages of a Flipped Classroom

The flipped classroom teaching model originated in the United States. Because flipped classroom teaching mode can improve students' learning attitudes, make students change from passive learning to active learning, and strengthen communication and interaction between teachers and students, it also improves teachers' professional satisfaction. Therefore, it is well-known by many teachers and schools and becomes a typical model of global education reform research^[3]. The flipped classroom teaching model was first introduced in China in 2011 and has now received widespread attention from many university education and teaching reform workers. A flipped classroom, as a new thing that evolved from traditional teaching models, has better development space. As the name suggests, a flipped classroom adjusts the order of traditional teaching, thereby mobilizing students' initiative and promoting teacher-student interaction.

Compared to traditional teaching methods, the flipped classroom is not only a simple reversal of the teaching order but also a reform in teaching. It has many advantages: in the reformed teaching mode, students no longer learn passively but rely more on themselves to actively learn and understand, thus having more self-directed learning ability. They can use this to remember more [4].

4. Development of flipping mode for water conservancy engineering and construction courses

The content of this educational reform model includes: 1. The course content is a combination of

offline and online, with homework assigned before class, requiring students to do their own pre-class exercises and draw the course roadmap, and then engage in self-learning and discussion; 2. The teacher shares the teaching plan with the students and discusses tasks with them, fully communicating in both directions and constructing a model framework; 3. Classroom students will answer questions and offer rewards based on their usual grades^[5].

Usually, there are many apps commonly used for online teaching, such as MOOCs for college students, QQ live streaming, DingTalk live streaming, Tencent conferences, etc. It should be noted that the videos arranged for pre-class preview should not be too long, as it can damage students' enthusiasm, curiosity, and efficiency. In addition, fully utilize the advantages of various online teaching methods, such as playing as many videos as possible during online teaching, using unconditional offline teaching methods, and enabling recording functions for easy review. One week before class, publish online teaching resources on the school's online teaching platform, requiring students to use their spare time to independently complete their studies. In order for each student to complete the learning content with high quality and quantity, the duration of each front-line learning session should not exceed 20 minutes, and students should be informed that online learning before class will be included in the final grade as part of the process assessment of this course. After a certain amount of pre-class preparation, students will have a rough understanding of the course. In addition, students should also be tested for their preparation situation, and their enthusiasm and initiative should be stimulated by increasing their grades. Students should be encouraged to actively teach their understanding of the course and raise their own doubts for everyone to answer. Then, the teacher will throw out the questions, provide guidance, and continue to solve them step by step in the text. Gradually forming the clue of "discussion guidance discussion", the teacher will connect the knowledge in the classroom, guide everyone to sort it out, and give students some time to consume. In addition, post-class consolidation is also an extremely important part. Through reading papers from multiple angles and examining students, it has been found that conventional classroom assignments do not have much effect. Therefore, it is necessary to use a combination of online and offline methods, such as different types of grouting for different geological conditions, during the construction process of water conservation projects. Why is clay grouting sometimes used? Why is curtain grouting sometimes used? Contact grouting, consolidation grouting, etc. can enable students to collect specific grouting requirements and applicable conditions for different engineering areas and conduct classroom presentations. Finally, there should be clear rewards and punishments, and for those who actively answer questions, regular scores should be given. Therefore, a diversified reward system has been established. Taking the water conservancy engineering construction course as an example, the exam results are divided into two parts: online and offline rewards. Under this flipped mode, the comprehensive score mainly accounts for 60%, and the final score is 40%; In addition, to increase students' motivation, online and offline grades (58% online and 42% offline) have been set up, as shown in Figure 1.

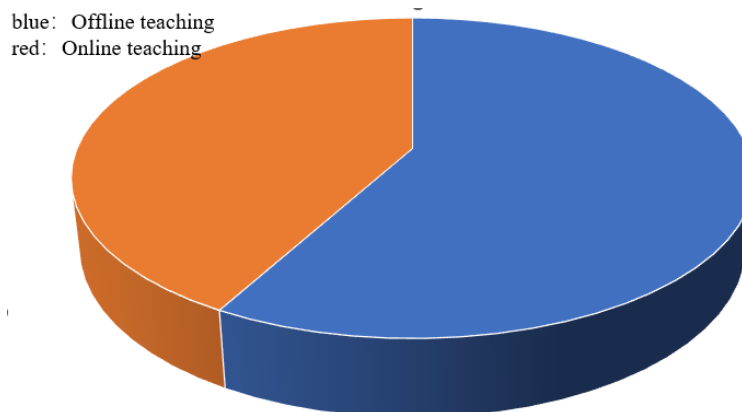


Figure 1: Reward Rules for Water Conservancy Engineering Construction

The offline teaching rewards include: classroom interaction (10 points), group discussion (10 points), classroom presentation (10 points), classroom attendance (10 points), and classroom activity (2 points); Online teaching rewards include: PPT drawing (15 points), software and video completion (30 points), feedback (8 points), and attendance rate (5 points).

5. Feedback on the Water Conservancy Engineering Construction Course

After the class ended, a survey questionnaire was conducted for Class 2021 of Hydraulic Engineering at the North China University of Water Resources and Hydropower, as shown in Table 1. It can be seen that the majority of students still hold a satisfactory attitude towards the flipped teaching method. Students believe that this method greatly reduces the awkward situation of a single teacher teaching, enlivens the vitality of the classroom, and makes the classroom more interesting. Flipped classrooms greatly enrich teaching content, cultivate students' autonomous learning and oral organization abilities, and effectively apply knowledge, which is of great significance! [6-8]

There are also some problems that need to be solved urgently in the implementation process of flipped classroom teaching. Firstly, students' understanding of the new teaching model. The adaptability of the style varies. Most students can quickly change their roles and adapt to the new teaching mode, but there are also a few who share the same. Influenced by the traditional classroom teaching mode, learning still lingers in the self-learning mode of rote learning of textbooks, and the awareness of active learning is not strong enough. Resulting in the inability to complete the learning content within the specified time and even feeling frustrated. So, teachers should have a purpose before starting classes. Guide students to adapt to the flipped classroom teaching mode, enabling them to fully understand the implementation plan and structure of the teaching mode and become familiar with it. Understand the usage methods of teaching platforms and establish correct learning concepts. Secondly, some students lack motivation and are unwilling to take the initiative. Discuss issues and express opinions. Teachers should promptly address the questions raised by students in the discussion area and guide them to participate in Q&A discussions. Encourage students to express their opinions and pay attention to inactive students. In addition, compared to traditional teaching methods, switching to classroom teaching mode requires teachers to spend more time and energy building and preparing online teaching resources. Meanwhile, pre-class learning also takes up students' spare time, and some students perfunctorily respond, resulting in poor teaching quality. Of course, flipped classroom teaching. The learning model may also encounter other problems during the specific implementation process, and further improvement and optimization are needed in practice.

Table 1: Questionnaire on the Flip Mode of the Water Conservancy Engineering Construction Course

Serial Number	problem	option	%
1	The level of recognition and preference for the flipped classroom model.	excellent	47.12
		good	31.83
		pass	8.17
		bad	2.88
2	What is the effect of flipping mode compared to traditional mode?	excellent	51.70
		good	38.30
		pass	8.30
		bad	1.70
3	Is the combination of pre class and post class effective?	excellent	58.30
		good	36.70
		pass	5.00
		bad	0.00
4	Is using a "discussion guidance discussion" approach helpful for your learning?	excellent	64.11
		good	21.62
		pass	9.24
		bad	5.03

6. Summary

This article takes the course of water conservancy engineering construction as an example, and by comparing the drawbacks of traditional teaching methods, it introduces the advantages of the flipped classroom. By utilizing the internet, a pre- and post-class teaching mode is adopted to reform the teaching of water conservancy engineering and construction courses. This model encourages students to learn independently while using the teaching method of "discussion guidance discussion" to enhance students' enthusiasm. Finally, an online and offline reward mechanism is established to stimulate students' initiative, innovation, and language expression abilities. Among them, digital media, combining online

and offline teaching methods to present each other, has achieved a new innovative model with students as the main body and teachers as the auxiliary.

In summary, the flipped classroom teaching mode for water conservancy engineering construction courses has been proven to be feasible through experiments and research. However, the flipped mode is not yet mature and needs further improvement and development. It is hoped to provide a reference for education reform in the context of the Internet.

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