

Study on the Key Factors of the Flipped Classroom Teaching Model

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Abstract: In the future, education must focus on students' learning. It focuses on students' learning, greatly improving learning efficiency, and is an effective method for future education. Flipped classroom realizes the reversal of the two stages of knowledge impartation and knowledge internalization in traditional classroom. In flipped teaching, teachers change from imparting knowledge to guiding and promoting learning. Teaching videos assume the responsibility of knowledge transfer, and their quality has an important impact on the effectiveness of knowledge transfer. To improve teaching effectiveness, teachers need to create a personalized collaborative learning environment for students, and be able to design classroom activities based on discipline characteristics, learner characteristics, and advanced teaching concepts. There are the three key factors in the flipped classroom teaching model, which are the design of instructional videos, the construction of personalized collaborative learning environments, and the design of classroom activities. By interpreting the connotation of flipped classroom, this article clarifies the positioning of the role of teachers, and explores key factors such as instructional video design, the construction of personalized collaborative learning environments, and the design of classroom activities, with a view to providing reference for the implementation of flipped classroom. Thereby promoting students to become masters of learning and improving the effectiveness of teaching.

1. Introduction

The continuous development of information technology has promoted the process of educational reform and opened up the possibility of better-promoting teaching and learning. In 2011, Salman Khan introduced a new teaching method - "the Flipped Classroom" at the TED conference. It has attracted the attention of educators. At present, more and more schools have applied the Flipped Classroom to teaching practices and have achieved good results. At the same time, some educators have encountered many difficulties in practice. They even question the flipped classroom model, such as the belief that the flipped classroom model makes the teacher's role significantly less important, and that the teacher is only in the classroom to watch the students do their homework or answer their questions. Students do not like to watch boring videos at home, and this mode of teaching does not motivate them to learn, so the learning effect is not good; teachers cannot monitor whether students have watched the teaching videos, etc. ^[1]. In response to these problems, this

paper explores the key factors in the flipped classroom teaching model from the connotation of Flipped Classroom and based on clarifying the role of teachers, to provide a reference for the effective implementation of flipped teaching.

2. Basic Connotation of Flipped Classroom

The definition of the concept of a flipped classroom by researchers is more from the perspective of the implementation process and the essence of learning, and its definition can be roughly summarized as the learning process usually includes two stages - knowledge transfer and knowledge internalization.

The flipped classroom is a reversal of these two stages, where students complete the transfer of knowledge by watching instructional videos before class, and students complete the internalization of knowledge in class through various forms of instruction, such as group discussions, homework assignments, and individual teacher tutoring [2,3].

However, this definition does not inform practitioners of the criteria for judging a flipped classroom. Is it considered flipped when students first study before class and discuss in class? This is not the case. In the flipped classroom, the knowledge transfer before class needs to reach or even surpass the teaching effect of the instillation lecture in the traditional classroom to be considered as having completed the knowledge transfer and entering the knowledge internalization stage. In the classroom, students need to fully internalize their knowledge and not continue to leave the task after class.

Therefore, the success of a flipped class is judged by the fact that the student's learning before the class is comparable to that of the teacher's lecture in a traditional classroom, and that the students have internalized the content of the class during the class.

How to fulfill these two criteria is a challenge for educators now. According to the process of flipped classroom implementation, several key points can be derived: instructional videos, classroom activities, and learning environment. The overall designer of these three key points is the teacher. The teacher's role has changed from that of "sage" and "actor" in traditional teaching to that of "partner" and "director". Teachers decide how to choose or produce teaching videos, the organization of classroom activities, and the construction of the learning environment. As a result, the teacher's role has become more important.

Students learning before class determines the effectiveness of knowledge transfer. The effectiveness of students' learning before class is mainly influenced by the instructional videos that teach the tasks. Therefore, how to design instructional videos that are popular with students is an aspect that educators need to pay special attention to. Changes in learning concepts and learning styles necessarily require a corresponding learning environment, and flipped classroom teaching should provide learners with a good environment to meet their needs as learning centers. The most critical point of the flipped classroom is that it frees up classroom lecture time and extends classroom activity time, and how classroom activities are designed determines the quality of knowledge internalization.

3. The Role of Teachers in the Flipped Classroom

In the flipped classroom model, teachers need to position themselves in their roles. The flipped classroom changes the teacher's role from a lecturer in a traditional classroom to a facilitator and designer of learning. The teacher is no longer the center of the classroom, the students are the new protagonists of the classroom, and the teacher no longer plays a "one-man show", but becomes the "director" of the classroom, coordinating the layout and letting the students become the focus.

This presents opportunities and challenges for teachers in the flipped classroom. Undoubtedly, teachers' abilities and talents are maximized and released in the flipped classroom. Teachers need to provide students with quality learning resources that are conditional on the ability to complete the transfer of knowledge. These resources can be created by the teacher or obtained through open educational resources.

In this session, the instructor's ability to create teaching resources or select quality resources is well demonstrated, something that may rarely be considered in a traditional course.

The flipped classroom gives teachers the space to fully utilize their teaching characteristics. Teachers no longer have to be confined to the traditional limitations of teaching time and can organize various learning activities according to their understanding of the learning content, so that students can complete the construction of the knowledge system.

The flipped classroom frees teachers from the process of teaching knowledge and allows them to use their creativity to organize the classroom. As Salman Khan said, "More and more students are coming to see Khan Academy's teaching videos without teachers being worried about it because they find it allows them to showcase their talents." [4]

The flipped classroom brings benefits to teachers while also providing more challenges and higher demands. In addition, teachers need to get students to think deeply and check what they have learned before the lesson. When providing learning resources, teachers need to consider the diversity of students. This means catering to the individual needs of students and providing different learning resources to students at different levels. Before the class, teachers need to organize students' questions that arise during the pre-class study, and then solve students' questions in class through communication and discussion to enhance learning. As students engage in classroom activities, the teacher continues to provide timely instruction based on learning to promote the completion of the internalization of knowledge. Aaron Sams, a teacher at Woodland Park High School in the U.S., says, "The flipped classroom makes teachers more responsible by reversing the roles of teacher and student; what is needed in this type of classroom are professional educators who are responsible, caring, and design savvy."

4. The Key Factors of the Flipped Classroom Teaching Mode

Some factors are critical in the implementation of a flipped classroom and affect the effectiveness of the final flipped classroom implementation. They are instructional videos, learning environments, and classroom activities. This paper proposes ways to enhance the key factors of the flipped classroom, starting from several successful cases of flipped classrooms.

4.1. Teaching Video Design

The idea of flipping the classroom is not new in the past few years; it was tried at the United States Military Academy at West Point as early as the 19th century. However, it has not received widespread attention until the last few years, which is not unrelated to the lack of technological tools and related resources. Initially, the textual or multimedia materials that teachers showed to students before class did not interest them and did not lead to good learning outcomes, which led to a failure to internalize knowledge in the classroom and to achieve the expected results of the flipped classroom.

When micro-videos like Khan Academy appeared, educational researchers discovered tools that could replace teachers in knowledge transfer and made the flipped classroom a popular teaching model. Currently, micro-videos are the most used in flipped classrooms, although a few schools use specialized e-textbooks. This paper explores how micro-videos should be produced to achieve the desired effect on students' learning before class.

Professor Zaid AliAlsagoff has suggested that the role of instructional videos is to "inspire, influence, and inform" and that they are characterized by "LECTURE": Lively, Educative, Creative, Thought-Provoking, Understandable, Relevant, and Enjoyable.

The success of Khan Academy and Woodland Park High School also provides some implications for researchers producing micro-videos.

- Features of Khan Academy instructional videos

Khan Academy is an educational non-profit organization founded by Salman Khan, whose main objective is to provide free instruction using online videos, with over 2,000 instructional videos on subjects such as math, history, finance, physics, chemistry, biology, and astronomy. The organization's mission is to provide high-quality instruction to learners worldwide and to accelerate learning for students of all ages.

To better summarize the characteristics of Khan Academy micro-videos, the author conducted a statistical survey of Khan Academy videos in Net Ease Open Class and combined it with relevant literature to find that.

- a. The maximum length of the video is no more than 14 minutes, generally, around 10 minutes and the shortest is only 3 minutes.

- b. The image of the teacher does not appear in the teaching video. Learners can only hear the teacher's voice. The teacher presents the content through a simulated electronic blackboard or PPT and then combines it with a handwritten board to explain the whole process by generating a video through screen recording software. Khan explains that this is to put the learner in a more relaxed state of mind and to focus on the content. Especially since students don't want to see them again when they return home after facing teachers all day, a simple screen is much cuter than a condescending adult.

- c. The teacher's voice is clear and bright during the explanation, and the speed of speech is moderate.

- d. The presentation of video knowledge content is mostly recorded in terms of topics. Many topics are directly cut to examples and explained at the beginning, without any hints or padding.

- The success of the Woodland Park High School instructional video

Jonathan Bergmann and Aaron Sams, chemistry teachers at Woodland Park High School, where the flipped classroom originated, advised on how to create instructional videos that are popular with students based on years of experience in implementing flipped classrooms^[5].

- a. Keep videos short.

Students today are the "YouTube generation" and they like short fragmented videos. If you want to teach quadratic equations, then teach only quadratic equations and do not add anything else. To start, teachers record videos that are the same length as a traditional lecture and contain a lot of learning objectives. In a traditional classroom, this is fine, but in an instructional video, what the teacher needs to do is take one video per topic and compress the length of the video to 15 minutes or less, preferably about 10 minutes.

- b. The sound should be lively and energetic.

Apart from the PPT interface, the only thing that attracts students' attention in the video is the teacher's voice. Speaking with passion will make students learn more effectively^[6].

- c. Collaborative videotaping with another teacher.

Two teachers collaborate, one acting as the student and one as the teacher. Teachers with years of teaching experience know which points students struggle with understanding, and they address those issues in their conversations. Students at Woodland High School generally report that watching two people in the conversation has a better learning effect than watching one person lecture.

- d. Add humor to the teaching.

The humor will put students in a good mood to start learning. The videos produced by Berman and Sams usually begin with a one-minute humorous joke. Students who enjoy listening will improve their mood and increase their interest. Students who do not like to hear it may also choose to skip it and go directly to the content study^[7].

e. The video should capture the students' attention. In the post-processing of the video, you can highlight the key knowledge by adding annotations and enlarged close-ups of key knowledge points. For example, in the process of chemistry experiment demonstration, step-by-step descriptions with markers and close-ups of key operations will allow students to better grasp classroom knowledge.

Thanks to their experience, we can conclude that instructional videos should be short and create a relaxed learning atmosphere. The design of instructional videos should be tailored to the learning characteristics of the learners. By attracting the attention of students, knowledge is efficiently transferred. The ability of students to complete instructional videos determines the quality of knowledge transfer and plays a critical role in the subsequent internalization of knowledge.

4.2. Construction of a Collaborative Learning Environment

In the flipped classroom, technology tools, and information resources become the basis for student learning. Collaborative learning environments are created to help students develop self-directed and collaborative learning skills. In a flipped classroom, students have strong control over their learning and can engage in self-organized inquiry-based learning through instructional guidance and technology tools.

In addition, in establishing a learning environment, teachers need to consider how to monitor students' learning behaviours and be able to provide timely feedback to students who encounter problems. Teachers need to consider how to help students accomplish self-directed learning and encourage collaborative learning among students. Teachers at Lake Elmo Elementary School in rural Stillwater, USA, have built a Moodle platform for their students, equipped with iPads and headphones. Teachers upload lesson-specific videos targeted questions and extensions to Moodle. Students first need to watch 10-15 minutes of instructional videos on the platform, complete some basic exercises for comprehension, and then submit them. Teachers can use the Moodle platform to understand students' answers to questions and can design classroom activities in a more targeted manner. In addition, the Moodle platform supports students' collaborative learning, and teachers can facilitate mutual support discussions among students through task design to promote the formation of a learning community^[8].

At Highland Village Elementary School in the United States, teachers encourage students to bring their own technology devices (BYOD), including tablets, e-books, and smartphones, into the classroom as part of the flipped classroom. To make it easier for students to collaborate and create a comfortable learning environment, the school has set up a "Starbucks classroom": Instead of the neat rows of desks in a traditional classroom, there are round tables, comfortable couches and padded chairs, and computers. Principal Shawna Miller said the idea came from students who wanted a more relaxed, café-like atmosphere in a classroom where collaborative learning could take place in a relaxed environment and be more productive^[9].

This new style of the classroom is part of the district's effort to create a "21st-century learning environment. It is encouraging to see that students are doing better in this relaxed environment. The virtual learning environment and the physical learning environment are built to provide a personalized and collaborative learning space for students.

Before class, students can learn knowledge through the online learning platform and can expand on it according to their actual situation, and students and teachers can discuss and communicate with each other in real-time via the Internet. In the classroom, the breakup of the traditional

classroom layout makes it easier for students to communicate and discuss with teachers and classmates, and students complete the construction of knowledge in a relaxed and enjoyable classroom environment. The transformation of the learning environment ensures that students are at the center of learning and are better able to take advantage of the teacher's role as a guide and facilitator.

4.3. Design of Classroom Activities

The effectiveness of instructional videos attracts too much attention. However, in the flipped classroom, the most beneficial change to student learning is not in the pre-classroom learning, but in the classroom activities. By shifting the transfer of knowledge to before class, the flipped classroom frees up class time for the internalization of student knowledge. Teachers need to design classroom activities based on assessing students' learning before class so that students can internalize their knowledge in high-quality instructional activities.

In designing classroom activities, teachers need to take into account the characteristics of different subjects. In science courses, teachers allow students to engage in more independent inquiry-based learning. Teacher guidance is also crucial in social studies courses. In Chongqing Jukui Middle School, a flipped classroom was implemented in a poetry appreciation class on "Short Songs" in the language subject, where the teacher collected classic audio and video materials via the Internet for students to study before class.

In addition to an appreciation of the content of the poem itself, the video introduces examples of Cao Cao's recruitment, love, and respect for talent.

In the classroom, the teacher and students engage in a series of discussions and evaluations in response to Cao Cao, and in this format, students gain a more systematic and comprehensive understanding of the poem. Currently, a popular pedagogical model among classrooms implementing flipped teaching and learning that is popular among educational practitioners is project-based learning, in which instruction is carried out through questions or projects that allow students to complete knowledge construction through inquiry.

Liu Jingfu et al. point out that project-based learning is "a new inquiry-based learning model that focuses on the concepts and principles of the discipline, aims to produce and market the work to customers, conducts inquiry activities in the real world with the help of multiple resources, and solves a series of interrelated problems within a certain period, and consists of four main elements: content, activity, context, and outcome composition."^[10] This definition is instructive in guiding how to conduct project-based learning. The design of classroom activities needs to be targeted by the teacher according to the actual situation of the students to achieve personalized learning and internalization of knowledge in participation.

5. Conclusions

The flipped classroom is an emerging teaching model that has been called a "disruptive innovation" to the traditional teaching model, truly realizing the "student-centered" teaching concept. However, there are still some problems in the current research and practice, for example, the current status of research on flipped classrooms is that "practice is increasing, but there is little systematic research". Therefore, to make the new model of flipped classroom better applied in practice, educational researchers need to explore and summarize continuously, improve the various aspects of flipped classroom teaching in continuous teaching practice, and provide guidance to more teachers. The flipped classroom teaching mode also meets the core of the guiding ideology of China's education informatization development plan - innovative learning and teaching mode. With

the national trend of promoting information-based teaching, the flipped classroom will provide new ideas for teaching and learning in the information age.

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