

Application of Bloom's Taxonomy of Educational Objectives Revised Cognitive Domain in the Flipped Classroom: A Case Study of "History of Foreign Education"

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ABSTRACT

This study utilizes a case study to investigate the application of Bloom's Taxonomy to the flipped classroom, using "History of Foreign Education" as an example. The author used questionnaires, interviews, and documents to investigate and summarize the results of the study, and finally proposed suggestions for improvement. In this paper, the impact of the cognitive domains of Bloom's Taxonomy of Educational Objectives Revised in terms of six dimensions are investigated. Specifically, to explore the problems and ways to improve the flipped classroom, the effects of students' remembering, understanding, applying, analyzing, evaluating, and creating in the flipped classroom are discussed based on a case study of the history of foreign education. Case studies were used as the main method of this study, and the analysis showed that the flipped classroom model was highly attractive to students and had a positive effect on the development of cognitive domains, with the most significant improvement in comprehension and analysis skills. However, there are still challenges in which the learning materials need to be further improved and the teacher's ability to organize collaborative classroom group discussions needs to be further improved. These results provide an implication for instructors to more effectively implementation of the cognitive domains for Bloom's Taxonomy of Educational Objectives Modified to the flipped classroom.

Keywords: *Flipped classroom, Bloom's Taxonomy of Educational Objectives Revised Cognitive Domain, collaborative classroom group*

1. INTRODUCTION

With the advent of the digital learning era, flipped classroom has become a more and more popular teaching strategy. Meanwhile, its evolution and application have also been closely concerned by researchers all over the world. According to Bergmann Overmyer & Wilie (2015), flipped classroom replaces direct teaching with video, encouraging students to focus on important learning during class time [1].

Flipped classroom adheres to the conception of "student-centered" that carries out teaching activities, which requires students to watch the text and video materials related to teaching provided by the teacher before class, preview the knowledge points, and then participate in the problem-solving, analysis and discussion guided by the teacher in the classroom [2].

Students are more active than teachers in classroom activities in the flipped classroom [3]. When students can solve problems independently before class, it helps to improve their ability to solve complex problems in the learning process. In the teaching of educational courses, this model will stimulate learners' self-efficacy and the development of knowledge, and promote students' creativity [4].

Furthermore, providing students with classroom activities concentrating on higher-level cognitive tasks, e.g., debate, analysis, and synthesis exercises, is one of the important factors for the success of the flipped classroom [5]. Flipped classroom learning has been applied to many majors, and many systematic related articles have been published in the field of higher education, including nursing [6], medical [7] and engineering [8].

The effectiveness of flipped classroom is often studied in the humanities subjects of higher education [9]. Humanities demonstrates the impact of previous events on the present and future, as well as leading effect of a person may grow as a result of his or her experiences and observations [10]. It is necessary to pay attention to the nature of flipped classroom, and then think about how to arrange learning tasks before, during and after class, so as to boost students' learning ability.

In 1956, Bloom developed a classification with three dimensions of learning, also known as Bloom's taxonomy. For cognitive domain, it provides a pyramid of six levels of learning objectives and skills. Its sequence from low to high is Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating.

The teaching activities based on the revised Bloom taxonomy are closely related to the flipped classroom. Teachers can set more specific teaching objectives and arrange corresponding teaching contents according to the six learning levels. It is important to establish goals (learning goals) in teaching communication so that both teachers and students can understand the purpose of communication [11]. The lower the level of the pyramid, the dissemination of such information can occur independently. Besides, students can obtain it independently outside the classroom (remembering and understanding). For these activities that require higher-order thinking at the high level of the pyramid, greater critical reasoning needs to occur in the classroom.

The application of Bloom's revised taxonomy of cognitive domains to the flipped classroom has significant implications for student learning. It is mentioned in the study that future research needs to consider how the video material provided before the class has an impact on students' learning and what factors are included in the video to attract students' attention [3]. Teachers' technology literacy and expertise in flipping classrooms could be a source of the problem. Teachers' capacity to modify and accept learning materials, as well as the technologies used to deliver them, is critical in the adoption of flipped learning, since they must create an interactive movie or an instructive presentation slide [12]. Hence, the purpose of this research is to enhance the performance of flipped classroom based on applying Bloom's Taxonomy under the context of humanity subject in higher education.

2. METHOD

Additionally, the text materials and electronic materials used in the flipped classroom are fully sorted out. In this paper, it aims at exploring the implementation of Bloom Taxonomy in the flipped classroom, and the path to apply Bloom's cognitive

domain education goal classification theory to effectively improve flipped classroom teaching. The method of this study uses the case study method, which can ensure accuracy and alternative findings.

A course called History of Foreign Education was chosen as the case of the study.

as a subject of Humanity in the university, it aims to understand and study the development and evolution of foreign educational theory and practice in various historical stages of mankind and under various social environmental conditions. These include the origins of education, the emergence of schools, changes in the educational systems of Greek city-states, education in ancient Rome, education in the Renaissance, and educational thought in Europe and the United States from the late 19th century to around World War II.

According to the above flipped learning theory, the flipped learning model used in this course is divided into three parts: before class, during class and after class. The students in the class are all sophomores majoring in education.

2.1 Data collection

Data will be collected from three questionnaire survey, interview and document, which is conducted under the principle of triangulation, so as to enhance the reliability and validity of findings. Case studies are known as a triangulation research strategy. Data, investigators, theory, and even methodology can all be employed in triangulation. The first examples of this type of research may be found in Europe, specifically in France. Issue studies are undertaken by taking into account the viewpoints of the "actors" in the case at hand [13].

The questionnaire was distributed to students in the Class of 2018 who have accepted course and involved a total of eight quiz questions, with a total of forty-two questionnaires returned. It included questions about the development of students in the flipped classroom on the dimensions of the cognitive domains in Bloom's Taxonomy of Educational Objectives Revised. Respondents were asked to provide authentic responses to the questions based on how they felt in the classroom and how they felt at the end of the course.

After collecting the surveys, they were examined and evaluated to see if there were any common themes in the responses. Then do an interview to perform a more in-depth study of specific issues. Following the distribution of questionnaires that identify representative and exceptional respondents, an interview is conducted.

Students need to preview the learning materials released by the teacher in advance every week, and then complete the learning tasks assigned by the teacher on

the network platform and submit them to the teacher in the form of homework. For example, after reading the material on the educational system of ancient Rome and watching the study video, we were required to complete the following questions asked by the instructor.

Question 1: Summarize the characteristics of education during the Roman Empire

Question 2: Read the historical materials and write notes by reading the “Description of Education in Old Rome” in the “History of Education” section of the online teaching platform. Write notes on the role of family education in ancient Rome.

Question 3: Summarize why Cicero advocates the training of eloquent speakers in education

Question 4: Summarize Quintilian's teaching ideas

Question 5: Summarize how Quintilian discusses the role of the teacher

Question 6: Write a speech for a classroom exchange with your classmates

2.2 Before class

Prior to class, teachers uploaded course materials of foreign education history on the network teaching platform. “Introduction”, “Syllabus”, “courseware”, “text materials” and “micro class video” are all provided. The instructor is a professor with many years of teaching experience, and has also led several classes in the history of foreign education in a flipped classroom format.

The syllabus describes the nature of the lesson, its purpose and task, as well as the setting of learning objectives and the organization of the learning plan. The description of the learning plan arrangement gives us an idea of the learning objectives and the learning content of each lesson. At the end, the teacher also provides the evaluation method and the main bibliography for this course.

In the teaching calendar, students have access to the knowledge and competencies required of them in the course. For example, in the lesson “Spartan and Athenian Education”, students will learn about the philosophy, goals, content, and methods of education in the Spartan and Athenian city-states. Students will then learn to consider the relationship between the educational philosophy and content of the city-state and the geography, politics, and economy of the city-state. Finally, through the study of the historical materials “descriptions of a day in the life of an Athenian student,” students will improve their ability to analyze historical materials and to develop a rigorous and practical attitude of learning and thinking from one piece of evidence to another.

The e-textbook section presents the knowledge that students need to master in advance for each lesson in the form of an article. The videos provided in the micro-lesson videos are lectures by the teacher of the class on the topic, and their content matches the content in the e-textbook. Individuals need to take notes regarding incomprehensible problems, so that they can put forward during classroom interaction for everyone to think and discuss together.

Then students will post their threads on discussion board communicating their learning achievements through group cooperation before class, and teachers will also pay attention to students’ learning progress and effect through the network platform.

2.3 In class

Focus on cooperative learning to discuss specific problems. According to the learning content and students’ independent learning before class, cooperative learning mainly adopts the following three modes.

The first model, group learning results presentation: on this week’s learning content, each student selects the part he or she is most confident in to present and explain to the group. Subsequently, group discussion on difficult questions: discuss and answer the difficult questions of the group members. Then, class presentation: One or two groups will be selected to present their learning results to the class, and other groups will propose additions or modifications. Finally, class discussion. Each group introduces what they have learned this week or raises unsolved problems, and the whole class discusses these problems.

The second model, group study and exchange primarily: each student will share with his or her peers what he or she feels the most or subverts his or her ideas, while each student will raise questions that he or she has doubts about for group discussion. Next, the group raises questions: each group submits the questions that the group cannot solve to the class WeChat group (preferably no more than 2 questions). Then, the group answers the questions: each group chooses a certain question raised by other groups, discusses it, and uploads the answer points to the class WeChat group. Finally, the class will present the results of the answers: each group will present the results of the answers to the class, and the class will discuss them, and the teacher will lead the students to think and investigate some questions in depth.

The third model, the JIGSAW. This model was used less frequently in this course, and was basically only used when the course content included multi-national education. The teacher assigns each group a topic to study (previewed before class and studied by the students before class). Each group of experts discusses the topic of each group, and each student tries to master

and understand the content of the group, and on this basis thinks about how to present it to other students. Afterwards, during the class, the “expert group” was disbanded and a “jigsaw group” was created, in which each “expert” in the “jigsaw group” presented his or her knowledge and insights to the other students in the “jigsaw group” in turn. Each “expert” in the “jigsaw group” introduces his or her acquired knowledge and insights to the other students in the “jigsaw group” in turn. Finally, the teacher randomly selects a “jigsaw group” to present the learning results to the whole class.

2.4 After class

Evaluation and summary. One student will be chosen in the group for the test and it is stipulated that the test scores of each selected student are the scores of each member of the group. After correcting, each group discusses and reflects on the test results, and reviews and summarizes the learning contents.

3. RESULTS

Three distinct themes emerged from the research data. The researcher identified and categorized themes as remembering and understanding, applying and analyzing, and evaluating and creating.

3.1 The impact on remembering and understanding

Learning material is prerequisite in flipped classroom for remembering and understanding which are the basic two levels in cognitive domain of Bloom's Taxonomy.

More than 80 percent of the students share delightful feeling toward flipped classroom learning mode. They consider that such mode facilitates to preview, grasp the direction of learning, help sort out information, and simulate the desire to learn. Materials are beneficial when they are well organized and logical. This helps me to sort out my knowledge slowly and clearly and increases my enjoyment of reading.

However, when asked the question “Compared to traditional classroom lectures, do you remember and understand better by watching electronic materials and micro-learning videos before class?”, nearly 90% of the respondents said that just watching the learning materials before class is less effective than explanation in traditional classrooms. The teacher has to explain in class the points that have been studied before the class in order to consolidate and deepen the memory.

Some students said that reading intricate materials before class might inhibit interest in learning. In the subsequent interview, the question was asked in depth: Do you think the materials are difficult to understand

because of your comprehension skills or because of the materials themselves?

The respondents further explain that: Perhaps personal reading comprehension needs to be improved, but some of the material itself is really complex and abstract, and the presentation is rather boring, such as academic text throughout and no illustrations to aid comprehension. Therefore, teachers need to control the depth of the material provided, i.e., it is not so simple that students feel unchallenged, nor so deep that they lose interest in studying it. It is best to include visuals to stimulate students' senses and assist with memorization and comprehension.

3.2 The impact on applying and analyzing

In terms of analysis and application of problems, most students said that this type of teaching is a process of sharing of knowledge and a mutually supportive learning. It involves questioning, analyzing, discussing and solving problems in small groups and in the context of the class. Students were able to gain discrepant perspectives in the discussion with their classmates, to open up their minds, and to understand and analyze problems more comprehensively and deeply after listening to the teacher's explanation of a certain problem.

Nevertheless, a small number of students claimed that although the discussions in class were useful thinking, the effect was very limited. This is because there are few refreshing ideas and they are all repetitions of facts. Hence, the discussion can feel even boring.

Additionally, the degree to which students think deeply about a problem is influenced by a very important factor in the classroom: the level of motivation of the students in the group, and indeed of all the students in the class. Classroom discussions sometimes get into some awkward situations, such as no students actively expressing their views and the class not being active enough.

3.3 The influence on evaluating and creating

In response to the question “Does the flipped classroom learning model help develop your interest and ability to construct, organize, and create education,” most respondents indicated that the impact was minimal. This was mainly due to the fact that the questions of quizzes were only those mentioned by the teacher in class, with standardized answers and limited space for students to create.

Students who felt it helped develop their assessment and creativity skills said they were more proactive in finding relevant information, choosing a presentation style, and finding more examples to prepare their

presentations in order to clearly explain what they understood to their peers. In addition, he was influenced by his education major and hoped to design a more effective flipped classroom

4. DISCUSSION

The process of this study divided the six aspects of Bloom's Taxonomy of Educational Objectives into three categories of cognitive domains and this section will explain what the results of the study indicate, make comments as well as give relevant recommendations.

This section includes a discussion of the above results and implications and concludes with recommendations for how the dimensions in the cognitive domain of Bloom's revised Taxonomy of Educational Objectives can be better applied to future research in the flipped classroom.

4.1 Customized Learning Material

Material is important, but it need to be customized according to discrepant factors. For example, students' capacity is supposed to be considered. The reading comprehension difficulty of the learning materials should be in line with the students' ability.

Referring to the element of video, the interviewees said that although teachers provide videos as materials for pre-study, it seems a bit tiring to repeat the study because the knowledge taught in the videos is almost exactly the same as the knowledge described in the textual materials. Therefore, it is believed that the materials provided to students should be well differentiated and each material should have its own unique learning value.

At the same time, respondents indicated that the clarity and length of the videos affect the learning experience. The length of a video can create a certain subconsciousness of "anti-learning", i.e., a perception that the learning time is too long, which leads to resistance and a loss of patience. Videos are designed to enhance impression and understanding, and if the video is clearer and of a reasonable length (e.g., a lesson is 45 minutes, then a prepared video of about 15 minutes is a reasonable length), learners will be happy to learn, concentrate, and deepen their understanding more effectively. One crucial function of the learning materials posted by the teacher is to facilitate repeated viewing and review of knowledge by students.

4.2 Teacher Professor Leading Discussions

In this part of the class, the teacher as a facilitator needs to organize students to think about and explore the problems. The study found that the majority of students believed that the classroom approach of collaborative learning in groups with timely and

targeted feedback from the teacher was effective in stimulating enthusiasm for knowledge exploration and the ability to analyze and apply it. This is also consistent with research that when flipped classrooms and cooperative learning are used together, they have a positive impact on student success as well as attitudes and behaviors [14]. Whereas, there are a number of issues that need to be taken into account. First, educators should pay attention to the state of the group discussion. The effectiveness of the lesson is not only related to the information provided by the teacher, but perhaps also to the level of participation of the group members. If the group members choose not to join the discussion, then it will not be possible to reach a situation of shared communication and deeper inquiry. Secondly, some students were unable to gain a sense of experience in the discussion, and their ability to analyze and apply was limited because the questions were not inspiring enough and everyone could easily reach a consensus.

To address these two issues, instructors should make reasonable arrangements in the teaching process. When assigning groups, random assignment may not be a good choice. Instructors can make heterogeneous grouping by observing and judging students' performance in class in advance, and inserting students with active personalities in each group, preferably those who can communicate and coordinate with group members. In the meantime, the group leader can be randomly assigned in each group at the beginning of each class, and each group member will have two to three minutes to express himself/herself. The group leader will count the speaking time of each person, and the rest of the students will take notes, and after the discussion, the teacher can randomly ask a few students to give a unified report on the group's discussion.

To tackle the problem of students who find the questions during the discussion less enlightening, a stepped learning approach can be adopted. Before the course begins, the instructor gives a list of questions in decreasing order of complexity and depth of understanding, i.e., students can use these questions as a reference for the discussion.

Additionally, the teacher, as the guide in the classroom, should assume the role of allocating class time appropriately. Schedule time for discussions that correspond to the difficulty and depth of the knowledge points to be discussed in class. More time will be allocated to complex issues that require in-depth understanding and research.

4.3 Corresponding Evaluation

It is also important to choose the means to test the learning outcomes. Flipped learning and formative assessment should be understood as a positive set of

methodologies [15]. Formative assessment is the assessment of the teaching process, focusing on the timely evaluation of what has been taught, keeping track of the extent of students' knowledge and discovering their potential. The information obtained is useful for students and teachers to take appropriate adaptive measures to improve the teaching and learning process according to their needs, thus effectively promoting students' development.

4.4 Future Research Recommendations

Future researchers need to address some of the challenges found when applying the flipped classroom, including what instructional approaches can be applied to more effectively improve students' ability to evaluate and create in the cognitive domains of Bloom's Taxonomy of Educational Objectives Revised in the flipped classroom, What should be the role of the teacher in collaborative learning in the flipped classroom, what should be the level of teacher involvement, and when should the teacher provide assistance to the students.

5. CONCLUSION

In summary, this paper provides a case study of a university's application of the cognitive domains of Bloom's Taxonomy of Educational Objectives Revised to a flipped classroom. Based on the survey, applying the six dimensions (remembering, understanding, applying, analyzing, evaluating and creating) of the cognitive domain of Bloom's Revised Taxonomy of Educational Objectives to the flipped classroom was more effective in helping students improve their remembering and understanding skills. Students are very interested in the flipped classroom. They are enthusiastic about the in-class group activities and the brainstorming sessions during the classroom discussions that stimulate their interest in further exploration. However, students' ability to analyze, evaluate, and create is difficult to develop and enhance if appropriate learning materials are not provided and if the teacher does not organize in-class discussions in a way that is relevant to the students. Designers should set up instructional approaches and implement specific educational strategies for each dimension of the cognitive domain to ensure that students have a better learning experience and are more effective in improving their learning abilities. Overall, these results shed light strengths and problems as well as the recommendations in linking the cognitive domains of the revised Bloom's Taxonomy of Educational Objectives to the flipped classroom.

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