Study on Construction of Innovative Talent Cultivation Model in Colleges and Universities Based on Flipped Classroom

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Abstract

Innovative talent cultivation is the reform demand for improving the quality of higher education, the need of promoting the all-round development of the people and the strategic requirement for building an innovation-oriented country. As the main position of cultivating talents, colleges and universities should be duty bound to shoulder the responsibility of cultivating new type of talents. On the basis of the investigation and analysis of the teaching behaviors of cultivating innovative talents in colleges and universities, this paper puts forward the teaching methods of flipped classroom and constructs a model of cultivating innovative talents in colleges and universities based on flipped classroom. By comparing with the traditional teaching methods, the model has been proven to meet the needs of cultivating innovative talents in China.

Keywords: Classroom teaching in colleges and universities, Flipped classroom, Innovative talents, Cultivate talents

1. INTRODUCTION

With the continuous development of society and economy, we ushered in the era of knowledge economy, and innovation has become the core of the era of knowledge-based economy. Only innovation can be invincible in the fierce competition, build an innovative country and improve the overall national strength of a country (Cooper, 2006). Innovation requires talents, and colleges and universities are the main position for cultivating talents. Because of the background and basic conditions of the popularization of higher education in China, the quality of cultivating innovative talents in colleges and universities is worrying.

Colleges and universities are the main position of talent cultivation, while classroom teaching in colleges and universities is the main channel to cultivate innovative talents. Students learn and develop through classroom teaching activities. The quality of classroom teaching directly affects the level of innovative talents cultivation (Guilford, 2011). Therefore, this paper adopts the method of questionnaire to investigate and analyze the teaching behavior of cultivating innovative talents in colleges and universities. After analyzing the existing problems of classroom teaching in depth, this paper puts forward the teaching method of flipped classroom. Based on the two-stage flipped classroom model, this paper constructs innovative talent cultivation model based on flipped classroom, analyzes the main tasks of teachers and students in the three stages of this model in detail, and proves that this model can meet the needs of cultivating innovative talents in China through comparative analysis of the traditional teaching models.

2. INVESTIGATION AND ANALYSIS ON TEACHING BEHAVIORS

2.1 Source of investigation data

This investigation adopts random sampling method, and randomly selects students with different majors in different universities in Shandong province, covering the arts and science subjects of different majors. The questionnaire is mainly designed from the perspective of students to understand the classroom teaching of cultivating innovative talents in colleges and universities and the students' learning behavior, mainly in the form of single choice and multiple choice. A total of 200 questionnaires were issued, 189 valid questionnaires were collected, and the results were obtained by Spss and Excel software.
2.2 Investigation on teachers’ teaching behaviors

2.2.1 Investigation on teaching objectives

According to the results of the investigation shown in Figure 1, about 80% of the students believe that in the course of teaching, teachers’ main task of teaching is to impart professional knowledge and skills in the book while only about 40% of the students think that teachers should bring innovative thinking and independent thinking ability into teaching goals in the course of teaching. Thus, it can be seen that at present, the classroom teaching in colleges and universities still takes the mission of preaching and giving lessons as the main task, but neglects the innovative quality cultivation of students' interest in learning, innovation and critical thinking.

![Figure 1. Main goal of classroom teaching](image)

2.2.2. Investigation on teaching methods

![Figure 2. Teachers’ teaching methods](image)
From Figure 2 and figure 3, we can see that in the classroom teaching, about 75% of the teachers are mainly engaged in teaching or lecturing + general questions, and only 5% of the teachers in in lecturing + classroom discussion; The teacher's teaching time is up to 89%, so they become the leader of class teaching while the students only spend 11% time on participating in classroom teaching or showing themselves, which is the typical passive learning model of the traditional teaching, which features teachers’ "teaching" and students’ "learning", greatly restricts the cultivation of students' learning enthusiasm, independent learning ability, independent thinking ability and innovation ability.

In Figure 4, we can see that for classroom discussions in classroom teaching, students think that the general effect accounts for 52.5%, which shows that the existing classroom discussion focuses on the form with lower students' participation enthusiasm and thus fails to achieve the desired teaching effect.

2.3 Investigation on students’ learning behavior

Figure 5 shows whether students are actively collecting or reading professional books and materials and Figure 6 is a pie chart indicating whether students read the materials that have little to do with the subject.

Figure 5 shows that about half of the students are able to take the initiative to learn professional knowledge, in which 8.5% of students who conduct a careful analysis of the relevant knowledge, while the other half of students have a low level of initiative in learning relevant professional knowledge.
The results of the investigation in Figure 6 show that only about 25% of the students often read foreign books, and most students only occasionally learn knowledge of other majors. This shows that students attach great importance to professional knowledge with a certain degree of self-learning, but relatively low initiative and enthusiasm, and a lower level of awareness of learning comprehensive knowledge, which is not conducive to comprehensive development.

3. RESEARCH ON INNOVATIVE TALENT CULTIVATION MODEL

From the above findings, we found that there are such issues in cultivating the innovative talents in classroom teaching of colleges and universities in China as (1) innovation-oriented teaching objectives have not yet formed; (2) classroom teaching methods are traditional and inefficient; (3) lack of subjective behavior, students’ innovative thinking and ability failed to be developed. In order to solve the above problems and improve the quality of classroom teaching for cultivating innovative talents, this paper puts forward the cultivating model of innovative talents based on flipped classroom.

3.1 Basic theory of flipped classroom

Originated from the US, the teaching model of flipped classroom can be simply explained as breaking the original teaching program, putting the course task in advance, that’s, the teaching contents to be taught in the classroom, and solving puzzles and other questions met before the class with interactive exchange (Dawson, 2015). This teaching model transforms the initiative of learning from teachers to students, and truly achieves the "student-centered" cultivation for comprehensive ability. Figure 7 shows the diagram of cultivating students’ comprehensive ability in flipped classroom (Wang et al., 2016). Although the research and application of flipped classroom has just started in China, and most of them are concentrated in primary and secondary schools, Figure 7 shows that students’ ability cultivated in flipped classroom meet the needs of cultivation of innovative talents in China, which indicates that flipped classroom also can play a good role in colleges and universities.

3.2 Innovative talents training model based on flipped classroom

3.2.1 Basic model analysis

Professor Robert from the United States proposed a two-stage flipped classroom model (Critz and Knight, 2016), which, as shown in Figure 8, divides the classroom teaching activities into two stages: before class and in class, and briefly summarizes the key steps in the flipped classroom, that’s, before class, students watch the video uploaded by the teacher and do simple exercises, while in class, the teacher assesses the learning situation of students and provides answers to students’ questions, finally offering the knowledge summary and feedback.
Understanding and communication skills

- Effective communication
- Active listening
- Understand others

Scientific thinking ability

- Study method
- Critical thinking

Application analysis ability

- Time management
- Coordination arrangements
- Decision making
- Persuade others
- Serve others

Management ability

- Professional competence

Practical ability

- Complex problem solving capability

**Figure 7.** Diagram of cultivating students’ comprehensive ability in flipped classroom

**Before class**

- Watch the teaching video
- Targeted pre-practice

**Class**

- Quick and small amount of evaluation
- Solve problems and promote knowledge internalization
- Summary, feedback

**Figure 8.** Robert’s Two-stage Flipped Classroom Teaching Model

### 3.2.2. Innovative talents training model based on flipped classroom

The two-stage flipped classroom model proposed by Professor Robert didn’t describe the specific content in detail, and the model has certain limitations and may not be suitable for the actual situation of China’s education. Therefore, many domestic education experts have designed a three-stage flipped classroom model that is suitable for China’s reality based on the two-stage flipped classroom model (Mcdonald and Smith, 2013). Based on the reference of domestic and foreign relevant literatures (Al-Zahrani, 2015) and the needs of innovative talents in China, this paper constructs an innovative training model based on flipped classroom (Betthavas et al., 2016) as shown in Figure 9.

The innovative talents training model based on flipped classroom is divided into three stages: before class, in class and after class, and introduces the specific tasks of teachers and students in the process of teaching in details (Smith and Mcdonald, 2013).
Figure 9. Innovative talents training model based on flipped classroom

(1) Before class: Based on the needs of innovative talents training, teachers should formulate the learning objectives of the lesson, related project tasks, and targeted exercises, design classroom learning activities, and publish video and other learning resources. The students carry out independent learning with the learning resources and tasks provided by the teachers, and can also set up a learning group for team learning, in which they can detect learning content through the targeted practice, and record difficult problems and learning experience in learning process for exchange and discussion with teachers and students in class. This process has greatly mobilized students' enthusiasm for autonomous learning and the ability to explore the ability to find and analyze problems.

(2) In class: The teacher changes from the original leader into the organizer of a classroom, organizing the students to exchange, discuss and study the content, results and difficult problems met before class, and cultivating students' ability to analyze and solve problems independently. The teacher should guide and explain, especially the key and difficult points of the course content, when necessary. As the main body of classroom teaching, the students collaborate with each other to analyze the tasks assigned by the teachers, and explore and complete the tasks. After completion of tasks, teams show their learning achievements, report and analyze the learning process and results, with the ways of evaluation by peers and the teacher. At last, the teacher summarizes the classroom learning activities to realize the internalization of knowledge.

(3) After class: The teacher summarizes the problems, reflects on the classroom discussion and study, and adjust the next teaching plan in time. Students can review and consolidate knowledge through group communication, network platform and reviewing reference books, and can also expand their knowledge.

3.3 Comparison of innovative talents training model and traditional teaching model based on flipped classroom

In order to get a more intuitive understanding of advantages of the innovative talents training model based on flipped classroom compared with the traditional teaching model, this paper compares flipping the classroom and the traditional teaching model in terms of the teaching content, time distribution, roles of teachers and students in the classroom teaching and teaching form, with the results shown in Table 1 and Table 2.

<table>
<thead>
<tr>
<th>Compare content</th>
<th>Flip the classroom</th>
<th>Traditional classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher role</td>
<td>Student learning mentor, facilitator</td>
<td>Master of knowledge and class</td>
</tr>
<tr>
<td>Student role</td>
<td>Active learners and researchers</td>
<td>Passive recipients of knowledge</td>
</tr>
<tr>
<td>Classroom teaching</td>
<td>Classroom learning + lesson inquisition</td>
<td>Classroom instruction + homework</td>
</tr>
<tr>
<td>Class time allocation</td>
<td>Most of the time teachers and students to explore learning</td>
<td>Most of the time for teachers to explain</td>
</tr>
</tbody>
</table>
Classroom teaching content | Problem exploration learning | Knowledge to explain and teach
--- | --- | ---
Teaching methods of application | Autonomous learning, cooperation to explore learning | Present content
Teaching Evaluation | Multidimensional evaluation | Paper test

Table 2 Comparison of time allocation between flipped classroom and traditional classroom teaching

<table>
<thead>
<tr>
<th>Flip the classroom</th>
<th>Traditional classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching activities</td>
<td>Time (minutes)</td>
</tr>
<tr>
<td>Warm-up before class</td>
<td>5</td>
</tr>
<tr>
<td>Answers to problems encountered by students before class</td>
<td>10</td>
</tr>
<tr>
<td>Guided or independent experimental exploration</td>
<td>75</td>
</tr>
</tbody>
</table>

Seen from the comparative analysis, compared with the traditional classroom teaching model, the biggest change of flipped classroom is that clipped classrooms make the students truly become the Masters of the classroom, and active learners and researchers from passive recipients of knowledge. The teachers also change from the Master in class to the mentor and facilitator of students’ learning, and guide students in independent learning and inquiry learning instead of "instilling" knowledge into students. At the same time, the time distribution in flipped classroom is more reasonable than the traditional classroom, most of the time in class is for the students’ guided or independent experimental or exploration activities, with better classroom interaction, which fully mobilizes the enthusiasm of students and develop comprehensive ability of students. In terms of teaching evaluation, flipped classroom can be evaluated from multi-dimensional perspective, such as peer evaluation and teacher evaluation, rather than a single paper test.

The comparative analysis proves that the innovative talents training model based on flipped classroom can improve the attractiveness and participation of the classroom, effectively raise the teaching quality and meet the needs of innovative talents cultivation.

3.4 Considerations in spreading flipped classroom in colleges and universities

1. Don't pay too much attention to the technical aspects of the flipped classroom. At the before-class stage of flipped classroom in the US, students may complete autonomous learning by watching the teaching video, so many domestic experts put the focus of the implementation on preparing the micro video and micro lessons. In fact, the activities before class can be completed through the video if conditions met in the application process, and teachers can recommend some relevant teaching websites or teaching reference books to students if conditions cannot be met, letting students looking up by themselves, designing and making relevant reading before class, and assigning project tasks to students for self-learning.

2. Flipped classroom cannot be copied completely, and should be adjusted according to the actual needs of the course. Teachers cannot carry out flipped classroom in accordance with the fixed teaching modes in each class, but make a reasonable design for the suitable teaching content according to the actual needs of the course and the students' physical and mental development, so as to achieve the expected teaching effect.

3. Pay attention to the rhythm of the class. Flipped classroom mobilizes students’ enthusiasm for learning and provides students with a chance to show themselves, but because of individual differences, the next step of teaching cannot be carried out when a nagging problem easily occurs, which requires teachers should make full preparation before class, and timely and appropriately bring students back to the orderly classroom and master teaching rhythm of the whole classroom.
4. CONCLUSIONS

From the perspective of improving teaching quality in colleges and universities and meeting the needs of cultivating innovative talents, this paper constructs an innovative talents training model based on flipped classroom in colleges and universities based on reading and referring to a large number of references, through questionnaires and comparative analysis, with conclusions as follows:

(1) Based on the investigation and analysis of the teaching behavior of cultivating innovative talents in colleges and universities, a teaching model of flipped classroom is proposed.

(2) This paper builds a training model of innovative talents in colleges and universities based on flipped classroom, and verifies that the model can meet the needs of training innovative talents by comparing and analyzing its advantages with traditional teaching model.

(3) This paper analyzes the considerations in popularization and application of the training model of innovative talents in colleges and universities based on flipped classroom.

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REFERENCES


