

# *Exploration on the Flipped Classroom Teaching Mode on General Chemistry of International Students*

Lizhu Zhang\*

Applied Chemical Department  
Chemical Engineering, Harbin Institute of Technology  
Harbin, China  
zlz4513@sina.com

Dongyan Tang\*

Applied Chemical Department  
Chemical Engineering, Harbin Institute of Technology  
Harbin, China  
dytang@hit.edu.cn

**Abstract**—The “flipped classroom” was focused on the organization of self-study pre class and the teaching mode about class teaching. Factors to restrict the practice of “flipped classroom” were analyzed and some methods were put forward to solving it. In the self-study section, teacher arranged self-study tasks and provided related materials to help students to study. In order to obtain a better self-study effect, teacher increased interaction with students by correcting pre-class exercises and asking for them related questions. In the process of class teaching, discussion was organized on knowledge points and difficulties. The contents missed by students are summed up by teachers. After class, students are also requested to do some homework which is more difficult than the pre-class exercises. In order to stimulate the “flipped classroom” implication, teachers and students should change their mind from “teacher center” to “students center”. Furthermore, the related department should support the teaching innovation and change the evaluation criteria of the academic performance.

**Keywords**—“flipped classroom”; self-study; teaching mode; discussion

## I. INTRODUCTION

With the continuous improvement of China's international status, more and more international students come to China for studying. The overseas students studying in colleges or universities are no longer a new thing. Due to the wide origin of overseas students, the large differences were found in knowledge background and English level which caused teachers are facing the biggest challenge on the foreign students teaching. As far as the current problems are concerned, the teaching methods are not fit for the overseas students because teachers are still the leaders in the teaching process and can't guide students according to their specific situations. Therefore, changing the traditional teaching mode is an effective solution to solve these problems.

The “flipped classroom” is a new type teaching mode in which the teacher gives the technology resources, such as the teaching video, self-study contents and requirements, to students to guide them self-study before class. Then in the class teaching, teachers and students discuss the contents or difficulties they met in self-study. It can be seen this teaching mode permit students as a study center. Teachers are no longer

the one who have lecturers of knowledge; students are no longer passive recipients to listen the lectures. It not only pays attention to the teacher's teaching, but also the learner's learning. Such teaching mode is favorite to support the students in independent, collaborative, exploratory learning and full respect the students' learning requirements as well as care about the individualized learning [1].

At present, the teaching mode of “flipped classroom” has been paid much more attention by educators. In 2014, Jing'an District Bureau of Education in Shanghai initiated and established the MOOC Alliance to discuss the MOOC and the “flipped classroom” teaching mode. The aim of the organization is to realize the transformation of our basic education from knowledge-basement to comprehension-orientation so as to promote the quality of education. Until now, more cites have joined the alliance and supported the teaching renovation. However, the researches on the “flipped classroom” in our country are still in the infancy stage and the theory is not perfect. For example, there are few successful cases in practising, the “flipped classroom” teaching is mostly concentrated on auxiliary disciplines, and more studies focused on primary education. Therefore, exploring the “flipped classroom” teaching model on university courses is necessary which can provide guarantee for international students to satisfy with Chinese teaching and give experience for the new-type classroom organization of higher education.

## II. THE “FLIPPED CLASSROOM” IMPLEMENTATION

Professor Jiao [2] put forward that “flipped classroom” is not a teaching technology or equipment innovation, but the teaching process changing which caught the tremendous changes in teaching efficiency. The “flipped classroom” teaching mode paid more attention to the center position of students and their self-study abilities. Although the teachers do not play the main role in the “flipped classroom”, they are still the dominant teaching parts. The effect for students self-study is closely related with the teachers' guidance and requirements. Therefore, teachers must prepare the class more effectively before the students start self-study.

### A. *The organization of self-study*

#### 1) *Arrange self-study tasks*

First, teachers should arrange self-study tasks according to the teaching objectives and teaching plan which include the contents to be mastered, the objective to be obtained, the topics discussed in class, the homework to be finished, and so on. The tasks for one class to be arranged are based on the difficulty of contents and the amount of knowledge points. If contents are difficult to be grasped, fewer contents were arranged in one time class. Then students can have enough time to make discussion, search for references and think about the related questions. But if contents are easy to be mastered, more contents were arranged. Such assignment can not only ensure teachers to complete their teaching plan, but also students can obtain the effective self-study effect.

#### 2) *Provide self-study materials*

Listening to the teachers lecture is still an effective way for students to master the contents. Therefore, in the self-study process, we provide on line videos of teachers having lectures to students. Due to in English teaching for foreign students, videos which can be used for self-study are very plentiful. Teaching videos from many famous universities, such as Harvard, MIT and other elite schools, can be obtained through the online open class APP. However, teachers should watch these videos and compare them before students watch them. Teachers can choose two or three videos which are more close to your own class and provide them to students. In the process of watching video, students can control their own steps, such as they can watch videos repeatedly or make notes for unfollow contents and get answers by their own thinking or discussion with peers or teachers. But for class teaching, students may be failing in understanding the contents if they can not keep up with the teacher.

The PPT including the teaching contents is also important for students to be used in self-study. Videos downloaded are not consistent with your own class, therefore, PPT can help students to know about the main contents that they should master. In the process of self-study, students can combine the video and PPT to engage in studying.

#### 3) *Enhance interaction between teachers and students*

Students can not finish the tasks assigned by teachers will cause the failure of “flipped classroom”. The reason for students in failing with self-study was originated from that they are not active to access information or solve problems. Therefore, it is necessary for teachers to strengthen the supervision and interaction with students in the process of self-study. First, we assign some exercises related with the self-study contents and require students to submit answers in some social media, such as WeChat and message boards. Then teachers correct them and feedback the results to students. According to the interaction, students can find the deficiency in their study and teachers can know about the cases of students mastering knowledge. In order to prevent students from coping with others, some students were chosen to complete special questions and submit the answers again. Furthermore, students were encouraged to submit videos about them discussion and share the experience for self-study which increase the interesting for them to finish the assigned work.

### B. *The implementation of class activities*

#### 1) *Discussion on class*

According to the self-study, students almost mastered basic knowledge. However, they can not get a deep understanding of the contents. Therefore, the teacher should help students to understand and master the knowledge thoroughly in class teaching[3]. Discussion is an important way for students to understand what they have learned. It is also a process for teachers to know how about students master the knowledge points and help teachers to make up the contents missed by students. Therefore, discussion is arranged in the class teaching. The discussing questions in class can be with respect to the learning task arranged pre-class, the difficulties that students met in self-study, the common problems encountered by the previous students, and the expanding questions about the contents. The questions may be raised by students, but most of them are summarized and refined by teachers. In the discussion process, students are organized in pairs or in groups according to the difficulty of questions discussed. In general, we choose the modest questions for students to solve in pairs, while the contents in panels to be discussed are generally a little more difficult. It is important that teachers take part in the discussion and induce the discussion face-to-face. Teacher can participate in each group one by one. As the group collaborative learning is easy to be formality, each team member should be clearly arranged the work and teachers need to strengthen the organization and counseling in order to fully innovate the enthusiasm of team members. In the final, the results of the group discussion should be reported and shared with others. The teacher should analyze the results and make remark on each group.

#### 2) *Teacher summary*

According to correcting exercises pre-class and classic discussion with students, teachers have known about the cases of students grasping the knowledge points. In general speaking, students may ignore knowledge points or can not understand part contents deeply by self-study. Therefore, it is necessary for teachers to sum up the knowledge points after discussion. The time for teachers to have lecture is almost half of the whole class. According to the summary, teacher can make up for the omission knowledge points by students during the self-study process and help students to master the knowledge thoroughly and deeply.

#### 3) *Practice after school*

After discussions and teacher’s summary, students can deeply understand what they have learned. However, the knowledge in their mind is not strong enough. In order to further consolidate the contents, students are required to complete corresponding homework after class which is quite more difficult than the pre-class exercises. Answers are still needed to upload on the social media. After correcting, teachers feedback the results and problems to students.

## III. REFLECTIONS ON “FLIPPED CLASSROOM” TEACHING MODE

### C. *The “flipped classroom” constraints*

Behaviors depend on the thoughts. The educational concept will induce the final educational behavior [4]. Until now, there are still some teachers who have the concepts that

teachers are the teaching center. They fill knowledge to students and can not accept the philosophy that students are the center in teaching[5]. Therefore, this traditional concept of education limits the “flipped classroom” to be carried out. In addition, our country has a large population with dramatic competitiveness which induced the students' learning purposes tend to be utilitarian. Therefore, students are more accustomed to exam-oriented education and many teachers would not like to try new teaching mode. Teachers are worried about the failure of innovation which can affect the students' future and their own development.

#### *D. Strategies for “flipped classroom” implementation*

##### *1) Change traditional concepts of education*

In the initial stage of “flipped classroom” introduced into our educational practice, both teachers and students should change their mind of teacher-centered educational concepts to students-centered. Furthermore, students should reduce their dependence on teachers and develop their study as well as exploring abilities. At the same time, the relevant departments are required to encourage and support the implementation of educational renovation.

##### *2) Enhance the teaching ability of teachers*

The essential step for the “flipped classroom” implementation is the student self-study process. Whether students can master the knowledge efficiently or not is the assurance of the “flipped classroom” to be successful. The class designation by teachers is one of the most important factor to stimulate students to study initiatively and master knowledge efficiently. Unless students are told the specific objective of self-study and given enough study materials, they can proceed to study. The “flipped classroom” designation includes the teaching materials, such as PPT, video, textbooks, setting suitable questions, interaction between teachers and students to be effectively combined. For example, if some meaningful and deep questions are assigned to be discussed, students can be motivated to try their best to find answers. They may discuss the questions with others or search for materials to solve them. When the students found the answers, they can feel satisfaction in the process of solving problems. Therefore, students will be interested in the self-study.

##### *3) Change the evaluation criteria*

Now days, the academic performance still determines the future of students in many cases in our country. Examinations assessment system is set in all school phase, especially in elementary school and high school. Academic performance determines their future school. If students get higher marks in the final examination, they may enter a better school where can provide more learning materials and better teachers. Therefore, many teachers are unwilling to try new teaching methods because they are worried about the failure of reform which will affect the fate of students. However, if the criteria to access the academic performance are diverse, not just relying on the scores, teachers and students will like to try the “flipped classroom” teaching. Therefore, multiple evaluation methods are suggested to be utilized, such as teacher evaluation, students evaluation, It can be seen the multi-evaluation system is more objective than the scores because

the ability of students to explore new knowledge is evaluated in the self-study process. The teacher and students can know about the study attitude of students and the knowledge level by classic discussion. Then they can give impartial evaluation.

#### IV. CONCLUSIONS

In the “flipped classroom” teaching for general chemistry, the organization of pre-class study and class teaching was explored. In the process of pre-class, teacher provided self-study materials and checks the study efficiency by correcting the pre-exercises. On the class, half time was provided for students discussion and the residual time was set for teachers to sum up the knowledge points. In order to promote the implement of “flipped classroom”, teachers and students should change their minds about the “teacher center” into “students center”. The related department should encourage and support the teacher to reform teaching mode and change the educational criteria from just scores to multi evaluation system.

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