

# *Teacher's Organizational Form and Role of Flipped Classroom*

—Taking the University Students' Chemistry Course as an Example

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**Abstract**—Flipped classroom is a new form of teaching with students' self-study before class and discussion in class. It emphasizes students' self-learning and avoids lecturing in class. Whereas the role of teachers in all processes of teaching cannot be ignored. This subject took the chemistry class for international students as the research object, and explored the organization and role of teachers in the three teaching processes of the flipped classroom, namely self-study before class, discussion in class and reflection after class. In the self-learning before the class, the teacher should make a learning plan to guide students, such as providing learning materials to them, and giving necessary supervision. In the course of class discussion, the teacher should guide the discussion of the students and summarize the main teaching contents. In the reflection, the teacher sets suitable questions for students to think. The research afforded some experience on the organization and successful implementation of the college flipped classroom teaching.

**Keywords**—*university chemistry; flipped classroom; classroom organization; teacher role*

## I. INTRODUCTION

With the internalization of undergraduate education, the questions faced on international student teaching emerge in many universities. At present, these international students are still mainly taught by teachers with students passively accepting the contents. It is imperative to reform the class teaching mode as students are unsatisfied with the conventional teaching mode with teacher having lecture.

Flipped classroom emphasizes the initiative property of students, and reverses the teacher giving lecture to students in class by students acquire knowledge by watching videos at home before class, and do homework, communication, discussion, project or experiment in class. The "flip classroom" has been focused on in the global education community since 2007 when it was put forward. In 2011, it was phrased as "a major technological change affecting classroom teaching" by the Canadian magazine named "The Globe and Mail". As the international students are fewer in one class, they prefer the new kind of teaching mode, and are well in English, the flipped classroom teaching mode is adopted in General Chemistry teaching.

The flipped classroom can be assorted into the following two modes. One is the two-step teaching mode with pre-class study and class discussion proposed by Zhang Jinlei et al [1] (2012), and the other is the three-step teaching mode. Discussing and raising questions before watching videos; finding answers while watching videos; applying and solving problems, and concentrating on questions to make in-depth exploration. Flipped classroom teaching emphasizes the subjective role of students, while the role of teachers in the class should not be ignored. Zeng Zhen[2] believes that the flipped classroom is a process of teacher-student interaction, cooperative learning, application and practice. Zhong Xiaoliu et al [3] (2013) proposed Flipped Classroom model alike Tai Chi Ring by integrating the concept of flipped classroom, Taiji thought in Chinese traditional culture and Benjamin Bloom's cognitive classification theory. The flipped classroom is a bilateral interaction process composed of teachers' teaching and students' learning. We cannot over-emphasize "teaching" and ignore "learning" like traditional teaching forms. It should avoid the case from one extreme to the other. Therefore, the flipped classroom teaching, regardless of the self-study before class, the discussion in the class, or problem solving after class, is inseparable from the guidance of the teachers. The flipped classroom may fail if the teachers can not effectively organize it. Therefore, this paper discusses the teacher's organizational form of flipped classroom teaching, and points out the role of teachers in classroom teaching.

## II. THE ORGANIZATION AND ROLE OF TEACHERS IN PRE-CLASS LEARNING

### A. Design self-study scheme and provide learning materials

The flipped classroom turns the lecturing in the traditional teaching into self-study before the class. Students are according to the teachers requirements to have self-study before class and acquire knowledge, achieving the teaching goals. In this process, teacher should carefully design the self-learning plan for students. It usually includes the following aspects. First, learning contents. It is relative to the page range of the textbook or reference book, and also illustrates in detail what students need to master. It should also cover the actual application of the content. For example, the contents about the

equilibrium of precipitation and dissolution of insoluble salts, it can require students to master the solubility product constant expression, the application of solubility product rules. The relative contents can be displayed by PPT. Second, learning objectives which include the knowledge goals, ability goals, and the emotional attitudes and values goals of self-study. Here we also give an example by the contents of the equilibrium of sedimentation dissolution of insoluble salts. When setting the knowledge target, it is necessary to point out the extent to which different knowledge points should be reached. Whether we should have a general idea of the knowledge or master it and to what extent? Third, key points and difficulties. The key contents are what students must master, and the difficulties are the contents that students are prone to be confused about. In the self-study before class, teachers should clarify the key points and difficulties, so that students can be focused on learning with their own goals.

Some learning material, such as teaching materials and courseware are needed when students are self-study. With the development of scientific and technological information, there are many online courses, such as MOOC. However, the content of the online course may not be consistent with school requirements. Therefore, in order to achieve a good teaching effect, teachers try to make teaching courseware by themselves. The most commonly used teaching courseware is PPT and micro-course video. When producing PPT, teachers should cover the required knowledge points and mark key points and difficult points for students. Then students can clear the contents that they should know and master. As the process of producing micro-course videos is complex, teachers not only need be proficient in editing, but also need to present their rich teaching experience. For example, in the process of making video, teachers need to reflect on how to attract students' attention by enriching the video or raising some practical questions. Only by ensuring the coherence of the video, the interest of the contents and the comprehensiveness of knowledge points, students can achieve the desired results by self-study.

### *B. Provide method guidance*

In the traditional teaching mode, students only need to accept what the teacher taught. However, flipped classroom let students learn independently and obtain contents initiatively which requires students to have self-learning skills and methods. Therefore, it is necessary for teacher to provide students with learning method guidance to let them know how to learn by themselves. First, we need to help students clarify their learning goals. Benjamin Bloom, the famous American educator and psychologist, put forward the target teaching method in the 1970s[6]. He believes that the clear and specific learning goals will directly affect the effectiveness of teaching as it is both the motive and the destination of the teaching activities. Only when students have clear goals, can they learn with purpose and initiative. Furthermore, let students make good use of learning materials. For example, when reading, we can advise students to skim the text for the first time to impress the content of the textbooks in mind and understand the context of knowledge. After that, they can go on to refine and deepen what they have learned, such as the concepts, formulas, properties, and theorems that need to be mastered by

watching the video repeatedly. Moreover, student should be good at taking notes. They can take down the key contents and knowledge points they have learned, especially the contents they don't understand. Note-taking can not only help students sort out the knowledge points but also enable teachers to know about students' learning attitudes and the missing knowledge points.

### *C. Increase teacher-student interaction*

It is necessary for teachers to supervise in self-study. If students can't complete their own learning tasks, they can't have discussion in the classroom, let alone understand the knowledge. In the self-study stage, the teachers cannot supervise the students face-to-face, but they can also take the following measures to know the students' self-study. For example, set questions or test paper containing basic knowledge on the communication platform to let student finish within the specified time, so that teachers can be aware of the self-study of the student according to the their answer. Furthermore, to view the students reading notes. As the notes include the knowledge points ,difficulties and the problems that students have met, the teacher can know about the students' mastery of the knowledge and the problems that puzzle many students by reviewing the notes. In addition, students can also upload information such as learning experiences and self-study videos to help teachers understand the enthusiasm of students and improve the teaching design.

## III. INTERNALIZATION OF KNOWLEDGE IN CLASSROOM

In the pre-class stage, students may only simply know about the knowledge points by watching the courseware, and they may not fully understand the connotation. Class learning can help students discover knowledge loopholes and promote students to understand the contents what they have learned and their application.

### *A. Set up discussion topics*

Class discussion is an effective method for knowledge internalization. Teachers set questions for discussion according to the difficulties encountered by students in self-study, and the practical application of basic theory. In the discussion, students are divided into groups and compete with each other. Students' academic performance, gender, organizational ability, expressive capability and learning ability should be considered when grouping to make sure that each member is assigned tasks and plays roles. Only all members participated in the discussion, the overall effectiveness and personal benefits of the course can be guaranteed. Teachers can involve in the discussion of each group accordingly and help solve the difficulties in each group discussion. The results of the discussion are presented in the form of a representative report or written report. The teacher should correct what is wrong and fully affirm the correct results.

### *B. Teacher summary*

Both self-study and class discussion are induced by teachers. Although students can acquire knowledge in these two steps, the knowledge is often disordered in their mind and

cannot exist in system. Therefore, in the classroom teaching, teachers should summarize the knowledge points to help students form a knowledge network. In addition, in order to achieve in-depth learning, teachers should expand knowledge, create a situation of knowledge application, connect them as much as possible to students' lives, guide students to reflect, summarize learning methods, and encourage students to apply what they have learned to solve practical problems. As for the part of the dissolution equilibrium of insoluble salts, teachers should make a brief summary of the writing rules, solubility rules and applications of equilibrium constants, and explain the concepts that confuse students, such as solubility product and ion product.

### C. Evaluation

After the self-study, class discussion and teacher summary, students' learning will be evaluated in performance and grade. Performance evaluation is mainly on the attitude, responsibility, enthusiasm, participation, cooperation spirit and independent in the process of online learning and classroom work. It is the most important part of the assessment, accounting for 60% of the total score. The grade assessment is mainly conducted through classroom tests, accounting for about 40% of the total score. The assessment should be scientific, objective and impartial. Once the evaluation rules have been published, they must be strictly enforced. Otherwise, the teaching results cannot be guaranteed.

### D. Reflection after class

Classroom communication is the soul of flipped classroom, and reflection after class is the sublimation of flipped classroom. At this point, teachers need to turn themselves from the traditional spectator after class to the reflection designer. The teacher can leave some actual problems for

students to solve after the class discussion. Students can deepen their knowledge system and improve their comprehensive ability by reflection, data collection, investigation and research, and integration and arrangement.

## IV. CONCLUSION

Flipped classroom cannot run without the participation of teachers, regardless of the self-learning before class, the discussion in class, or the reflection after class. Teachers should carefully design each part of the class to ensure that students can learn independently. Teaching reform can only make sense if it can guarantee the learning effect of students. Only then, the flipped classroom is successful.

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