

# Reflections on Doubts from the In-service Chemistry Teachers in Secondary School

—Based on the Survey toward Education Master Degree Candidates

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**Abstract**—More than ten years ago, China started a new round of education reforms. What are the teaching behaviors of changes in teachers' classroom? What doubts and problems exist in the education and teaching for teachers? During the summer course, the researcher did an open question survey toward 16 EMD candidates from CNU in order to know their doubts and problems. Doubts and problems for teachers are discussed; the suggestions for in-service chemistry teachers training curriculum content are put forward.

**Keywords**—Doubts; In-service Chemistry Teachers; Secondary School; Survey; Education Master Degree Candidates

## I. INTRODUCTION

During the summer holiday some universities will offer a comprehensive program for in-service secondary school teachers to improve their teaching skills in China. The training programs for in-service secondary school teachers comprise a series of courses. This summer holiday our Chemistry Department of CNU (Capital Normal University) provided a series of courses for Education Master Degree (EMD) candidates who are in-service secondary school chemistry teachers. During the course of Modern Chemistry Pedagogy, the training teacher (that is researcher) did an open question survey toward these EMD candidates. "What are your problems and doubts in your chemistry class?" Then, the teacher questionnaires were collated and the researcher analyzed their answers, and provided some discussions and conclusions.

## II. BACKGROUND

Since 2000, education reforms have been carried out toward junior high school curricula, and from 2004, senior high school curricular reforms have started! With this reform, many great changes emerged, including syllabus, objective, the model and method of teaching and learning, evaluation and so on. Especially in science subjects, the teachers' mayor objective has gone from focusing on teaching students knowledge to guiding them how to learn and happily learn. The science education reform has a strong emphasis on improving the students' science literacy. Then, almost 10 years have passed, what have changed in our classroom or our teachers? The factors that contribute to the complexity must be identified

and systematically investigated so we can facilitate changes in teachers' classroom practice toward the vision of science education reform (Lederman, 1999).

## III. METHOD AND RESULTS

In this summer holiday, we had some in-service teachers who would like to get EMD, the data sources were based on these teachers' written responses to open-questions and informal interview.

### A. Sample

Sixteen chemistry teachers (five from middle school; 11 from high school) constituted the sample for this investigation. These teachers possessed a wide range in experience (four 5 years; seven 9 years; 6, 7, 10, 13, 17 years each.)

### B. Results

TABLE I. INFORMATION FROM THE JUNIOR HING SCHOOL CHEMISTRY EMD CANDIDATES INBESTIGATED

Number	Survey About Junior Chemistry Teachers	
	Gender and years of experience	Problems (doubts)
1	Female, 5 years	<p>Students don't finish their homework entirely by themselves. Sometimes some of them copy their work off others. This phenomenon is very common.</p> <p>When the students do the experiment or observe the experiment, they observe very carefully, but they can't get high scores in the examination.</p> <p>When I introduce some concepts, there are students who can't understand them in class, such as the concept of solubility, this makes me very frustrated.</p>
2	Male, 9 years	<p>How to stimulate students' interest in learning the chemical theoretical knowledge?</p> <p>How to build a harmonious interaction toward the teacher-student relationship?</p>

Number	Survey About Junior Chemistry Teachers	
	Gender and years of experience	Problems (doubts)
		How to deal with the relationship between the teaching effect and the teaching process?
3	Female, 5 years	<p>Coworkers who teach other subjects often assign a lot of homework that just requires students to copy, and nearly use all of their time, including the noon and after school hours. So the students often feel sleepy when they have the first chemistry lesson in the afternoon.</p> <p>The students have no motivation to learn and their parents also give no driving force to them. Half of them don't want to continue to study and go to senior high school.</p> <p>During the class, there are no students willing to participate. If there are two classes, this phenomenon is obvious. One of them is very active, and the other is very quiet in the classroom.</p> <p>How to deal with the teacher-student relationship? How to grasp the degree of relationship between teachers and students?</p>
4	Female, 5 years	<p>How to make different groups and teach them in different ways in a collective teaching environment? How to evaluate the results of this method?</p> <p>I plan to use the Learning Pyramid, but I dare not risk trying this method in the real classroom..</p> <p>Some students do well in other subjects except chemistry, I don't know why.</p>
5	Female, 17 years	<p>There are a lot of suggested experiments in the chemistry textbook. When we take part in the professional teacher training, we are required to reveal the teaching function and value of suggested experiments, but how to put them into action? We can see some rich and good teaching design including these suggested experiments, however in the real class, there are no changes. So how to reveal the teaching function and value of suggested experiments and put them into action in the real classroom? We don't know how to resolve this.</p>
6	Male, 7 years	<p>When I teach the students who have a poor foundation of chemistry knowledge, how to reduce the difficult more reasonably?</p> <p>How to manage and guide the questions over the periods of learning content that the students put forward?</p>

TABLE II. INFORMATION FROM THE SENIOR HING SCHOOL CHEMISTRY EMD CANDIDATES INVESTIGATED

Number	Survey About Senior Chemistry Teachers	
	Gender and years of experience	Problems (doubts)
1	Female, 6 years	<p>About new knowledge, especially the principle of chemical reaction, in one lesson, I taught so much knowledge almost the whole class. I was very busy teaching and the students were just busy listening. There was a lot of information in one class. However, the students had no time to do any exercises, when they began to do their homework; they had no ideas and no methods with which to resolve the problems. They seemed to understand in class, but they couldn't do the assignment. After the class I had the exercises class, the students could come up with the ideas to finish their homework. I have some doubts: Would it be good to have the new lesson and the exercise together? If I did, though I could provide the relatively complete knowledge, the students would think there was a gap between in- class and out- class. The results that they had the lesson were not effective. Is it necessary to separate the new lesson and the exercise one in two halves?</p>
2	Female, 9 years	<p>Student's attention span is just twenty minutes. The students lack active thinking in class, most of the time they only listen to the teacher and take notes, the notes are not reviewed after class. The problems that they don't understand are always the same. If the class is given sufficient time for students to think, the teacher is able to find the problem and student's doubts, but then they never finish the teaching task. How can we finish the task, not to delay the schedule, and let the students have enough time to exercise and think?</p> <p>Individual teachers demand too much, leaving a lot of class homework to be copied by the students. That'll take the students a lot of time, so that they have no time to learn science subjects, they are too lazy to think. They would like to copy without thinking.</p>
3	Female, 13 years	<p>How to train the student's thinking path when they solve the practical problems in Chemistry----- strategy of problem solving.</p> <p>How to teach the different chemistry knowledge in different amount of time and how to implement?</p> <p>Teacher4 (female, 20)</p> <p>How to culture the path of thinking about students when they solve the real chemistry problems -strategies about how to solve the problems?</p> <p>How to implement level - divided teaching toward chemistry knowledge or teaching content?</p>
4	Female, 20 years	<p>How to make different groups and teach them in different ways in a collective teaching</p>

Number	Survey About Senior Chemistry Teachers	
	Gender and years of experience	Problems (doubts)
		environment? How to evaluate the results of this method? I plan to use the Learning Pyramid, but I dare not risk trying this method in the real classroom..Some students do well in other subjects except chemistry, I don't know why.
5	Female, 9 years	Some students don't like to study at all. They have little interest in anything.
6	Female, 10 years	Enthusiasm in learning of an individual student is not high, such as there is in a sports student, he always sleeps every class, when the teacher checks his homework, he will say "the training is too tiresome, I have no time to write", he has no interest in learning, how to improve? Why does our country not provide career counseling for the students, they can be divided into two parts. If they have practical abilities, then they can go to some vocational school, and others can continue to study in high school and university learning some professional knowledge etc... In today's schools, county and so on, some leaders force the teachers to make the students enter universities, under this atmosphere, how can we consider maximizing the students enjoyment in learning chemistry, his achievement and interest all at the same time? Teaching for 10 years, how to break through the bottleneck period? (Ask myself questions) (Occupation burnout period)
7	Female, 9 years	After the new curriculum reform, inquiry teaching mode emphasized by the Department of teaching research and the leadership, the teacher in teaching design, found that not all courses could be designed into the inquiry teaching mode; Every class showed and school evaluation toward the class would give me a big headache After the change of chemical teaching materials, the knowledge of chemistry is repeated in many textbooks. For teachers, the depth of knowledge is difficult to grasp, according to the examination syllabus requirements (Low), the final test questions provided by the Department of teaching research are very difficult for the students, depth of knowledge, with the final set of requirements, is difficult to achieve.
8	Female, 9 years	Students have no motivation or interest in learning, or any objectives. They don't love learning. When the teacher explains that the chemical knowledge is applied in life, students are only interested in living examples, but most of them are not interested in the chemical knowledge. Sometimes I want to carry on the choice to the teaching material, because it's too difficult to understand for the students, but also

Number	Survey About Senior Chemistry Teachers	
	Gender and years of experience	Problems (doubts)
		compare the results with other teachers' scores, I'm not bold to make the choice. Although the documents are put forward to foster students' ability, I think that students' score is everything now. If we do not consider the students' achievement, other abilities of theirs may be ok except their scores, but my job is to teach the students in chemistry, it is a contradiction.
9	Female, 9 years	How to make students participate in the classroom? How to promote the teaching of concept and enable students to better grasp of its connotation and extension? How to construct students' knowledge system and enable them to grow in new development zone?
10	Female, 9 years	How to improve the efficiency of the classroom? How to make more students (basis is bad, how to solve?) understand? How to grasp the classroom management and classroom teaching skills? How to integrate the teaching materials and improve efficiency? As a teacher, how to improve the students' interest in learning, so that more students say, listen, ask the teacher and solve the problem?

#### IV. DISCUSSION AND CONCLUSION

Over a number of years has passed since education reform, we're glad to notice that our teachers from secondary schools have changed a lot. They begin to emphasize how students learn, even with individual students; they begin to know about why individual students can do well in some disciplines and badly in chemistry. They want to find the answer to why the students have difficulties in learning science concepts, especially abstract chemistry concepts. The knowledgeable person can collect the phenomena or events into a smaller number of meaningful units. The teacher already has such strategies but no students can necessarily apply these (Sirhan, 2007). The teachers don't know how to help students chunk.

There is no doubt that motivation to learn is an important factor controlling the success of learning (Sirhan, 2007). However, teachers don't know how to motivate students to learn.

We should provide some courses relating to how students learn in training teachers. An understanding of how students learn can help teachers to devise effective strategies for teaching (Sirhan, 2007). Provide teachers some help in the following questions: 1. what are the main areas of learning difficulty in chemistry?

2. What are the main aspects of reducing obstacles to learning? (Sirhan, 2007).

Students' motivation to learn is important; we should give some suggestions for teachers. For example, Resnick (1987) found that students will engage more easily with problems that are embedded in challenging real-world contexts that have apparent relevance to their lives. If the problems are interesting, meaningful, challenging, and engaging they tend to be intrinsically motivating for students. However, Song and Black (1991) indicated that students may need help in recognizing that school-based scientific knowledge is useful in real-world contexts.

How to deal with the teacher-student relationship? We should give teachers some help in training courses.

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