

Discussion on Improving Teaching Skills for Junior Lecturers Based on the Engineering Chemistry Teaching

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Abstract: Engineering Chemistry is a basic course for undergraduates who are not majored in chemistry. A comment issue is their high school chemistry levels are different and the students majored in different directions require differently for chemistry knowledge. The issue is magnified especially for junior lectures who do not have sufficient teaching experience. As one of the young teachers, this paper discusses the issues which arose in the teaching of the Engineering Chemistry course and available resolutions. It is expected to promote the development of the junior lectures.

1. Introduction

Engineering Chemistry is a public basic course for undergraduates of science and engineering in Yanshan University, and it plays a pivotal role in the knowledge structure system of undergraduates of science and engineering. The engineering chemistry course in our university is formed by the improvement of *General Chemistry*, which has been selected as a provincial high-quality course in Hebei Province [1-3]. At present, the course uses the textbook *Concise Basic Chemistry for Engineering Course* (edited by Li Qiurong, et al.), which is edited by our lecturers. The basic contents of the course include the aggregation state of substances, the basic principle of chemical reactions, chemical reactions in aqueous solution, the basis of electrochemistry and the basis of material structure. There are more than one hundred classes in our university every year, and the number of students is large, involving more than ten majors such as machinery, vehicles and automation. On the one hand, there are differences in students' chemistry fundamentals; students in some regions have been exposed to most of the chapters except the basis of material structure during their high school studies, while examinees in some other regions have hardly been exposed to any chemistry concepts because their elective courses are physics and biology [4,5]. The difference in basic knowledge makes classroom teaching a great challenge; on the other hand, compared with courses such as professional courses and the discipline frontier, the learning content of basic courses is slightly bland, which is difficult to stimulate students' interest and enthusiasm in learning. In addition, a few students think that *Engineering Chemistry* does not belong to the main courses of their majors, and they do not pay enough attention to the course and its orientation

is unreasonable; the different needs of different majors for chemical knowledge and other factors make this course of *Engineering Chemistry* face certain difficulties in the teaching process^[6-7].

Junior lecturers serve as the main force in the construction of colleges and universities. Improving the teaching level of higher education, promoting the construction and development of key disciplines, cultivating innovative talents in the new era, and promoting the development of China's education are all closely related to the cultivation of junior lecturers, whose professional quality directly affects the development of China's education^[8-9]. And teaching quality is the core of junior lecturers' professional quality. Junior lecturers have certain advantages: high educational level, strong quality to apply information technology, wide scientific research horizon, high foreign language level, most of them have overseas study background, easy to empathize with students, and active thinking; however, there are also some shortcomings, for example, although junior lecturers have received high-level and systematic education, they are not generally graduates of the normal college, have not received systematic training in educational theory and teaching methods, and lack the quality to respond in practice. On the other hand, not only do junior lecturers face the dual challenges of teaching and scientific research at work, but most of them in their initial social life have to bear various problems such as purchasing the house, getting married, children's education, and supporting the elderly, etc. Failure to deal with these problems properly will directly affect junior lecturers' enthusiasm and sense of responsibility for their career^[10].

As a typical case of "doctoral candidate→junior lecturer", the teaching process is inevitably plagued by various problems, including the control of the teaching time in preliminary stage, the expression of classroom body language, the maintenance of classroom discipline and, with the gradual accumulation of teaching experience, the consideration of how to improve the teaching level, classroom effectiveness and how to effectively use multimedia and other technological means to enrich classroom teaching [11]. Therefore, combining with the teaching experience of this course of *Engineering Chemistry*, the author has some insights and experiences to make a brief summary on how junior lecturers can improve their teaching quality from themselves and share them with their peers.

2. Clear Responsibility in Pre-employment Training

The induction training for junior lecturers is the first lesson for junior lecturers in colleges and universities to take up their posts, and it is usually conducted through centralized learning, with concentrated training on educational theory, educational psychology and professional ethics of lecturers. This training is often organized by the personnel office of the university for all new lecturers, which has the disadvantages of the large number of people involved, lack of flexibility in the form of training, lack of professional relevance in the training content, and weak participation of the objects trained, resulting in many junior lecturers not paying enough attention to the training and even taking the attitude of "going through the process" to participate the training. The national and social development has put forward higher requirements for lecturers of colleges and universities: a qualified college lecturer must have both morality and talent, which requires lecturers to take up the important task of guiding students to establish correct outlook on life, values and worldview while performing their duties as lecturers. Therefore, junior lecturers should be clear that the primary task of pre-employment training is professional identity and lecturer morality construction. Most junior lecturers have just finished their study career and have not yet completed the role change from student to lecturer and not to mention the deep understanding of the mission and sense of responsibility of lecturers of colleges and universities. The pre-employment training can help junior lecturers adapt to their new roles more quickly and cultivate professional identity, professional beliefs and lecturer morality and style construction. Chinese government leader emphasizes that lecturers should not only

be "pedagogues", but also "great lecturers", so as to build successors with high character, high conduct and high grade. In particular, lecturers of colleges and universities should not only teach professional knowledge, but lack the awareness of educating people. Therefore, through pre-employment training and study, junior lecturers can fully understand the lofty value of the lecturers profession of colleges and universities, enhance their professional ideals and beliefs as well as their lecturer morality and style construction, and improve their enthusiasm and motivation for imparting knowledge and educating people. In addition, through pre-employment training, junior lecturers can follow closely the pace of national education development, fully understand the situation and history, idea of educating people and management operation mechanism of the university, follow closely the discipline development and local characteristics, adapt to the new environment as soon as possible, form common values and development concept, make full use of university resources, formulate career planning suitable for individual development, and promote the construction of a high-level university with their own development.

It is important to note that the professional development of junior lecturers cannot be achieved overnight, but is an ongoing process. Junior lecturers clearly the lecturer morality and beliefs, understand teaching norms, and establish good professional morality and the spirit of cherishing posts and devoting wholeheartedly to work in their pre-employment training. However, teaching methods and teaching skills, etc. still need to be learned and practiced through continuous teaching training and teaching salons on and off universities in order to be gradually improved.

3. Master Teaching Skills in Teaching Training

Most of junior lecturers are highly educated and have a strong quality to learn. However, learning knowledge and imparting knowledge are two completely different processes. In the learning process, different subjects understand the same knowledge point in different ways due to different individual ways of thinking. As a lecturer, how to adopt a way that is generally accepted by the students, how to transmit knowledge accurately, logically and clearly, especially the teaching of key points and difficult points, requires certain teaching skills, which involves the expression of language, the combing of logical thinking and even the expression of body movements. In order to help junior lecturers improve their teaching quality, the author's college has been implementing the principle of "adviser sys", where experienced "veteran lecturers" are assigned one-on-one to guide new junior lecturers in their teaching quality. The "adviser system" helps junior lecturers quickly accumulate teaching experience, enhance communication and expression quality, and gain a sense of belonging. However, due to differences in educational backgrounds, new and veteran lecturers may have different concepts of educating and teaching, and the "adviser system" tends to limit the space for junior lecturers to develop. More importantly, the background of "first-rate universities and disciplines" construction of the Ministry of Education has put forward higher requirements on the teaching quality of university lecturers. In view of this, Center for Faculty Development of Yanshan University (hereinafter referred to as "Faculty Development"), in order to further improve the comprehensive quality of lecturers, makes full use of summer and winter vacations, weekends and other available time to organize training and exchange activities for lecturers on advanced teaching concepts and teaching methods. It is worth noting that the lecturer training here is different from the pre-employment training. With the concept of "lifelong learning", Yanshan University's Center for "Faculty Development" has introduced a series of "targeted" lecturer training programs to help lecturers improve their comprehensive quality.

Junior lecturers should actively participate in the process, learn the teaching concepts that are in line with international standards and use them as a guideline to design teaching programs, draw on successful teaching cases to design the teaching link, and enrich the teaching contents through

innovative teaching methods to enhance the learning enthusiasm of the students.

4. Accumulate Teaching Experience in Teaching Competitions

Regular evaluation and display of junior lecturers' educational and teaching achievements is an important way to improve junior lecturers' comprehensive quality. On the one hand, the teaching competition is a stage to focus on displaying individual teaching style and characteristics. By defining the rules of the competition and setting rewards for the competition, the spiritual demands of junior lecturers are satisfied. In realizing that in addition to professional knowledge, their teaching level is also improving and getting external affirmation, it can motivate junior lecturers' teaching enthusiasm and fully explore their potential, and guide them to better professional development. In the past five years, Yanshan University and the author's second-level college have held teaching competitions at different levels every academic year, involving the basic skills of junior lecturers and the design of ideological and political case of course. The second-level colleges select outstanding lecturers and recommend them to participate in the school-level competition, and select outstanding junior lecturers to participate in the province-level and nation-level competitions through the school-level competition. In the process of preparing the teaching link design, teaching PPT presentation and classroom interaction for the competition, the participating lecturers will fully think about and summarize the teaching contents, which will awaken the enthusiasm of junior lecturers for the genuine classroom and motivate them to deeply understand how to teach in a student-oriented way, and this process will certainly promote the individual growth of junior lecturers.

On the other hand, the teaching competition is an important platform for junior lecturers to learn teaching skills, exchange teaching experience, expand teaching ideas and carry out cooperative projects from each other. It is a special way for junior lecturers to enrich their teaching experience by observing and appreciating the teaching ways and skills of other participants, taking their strengths and using them for their own course construction and enriching course contents.

5. Improve Innovation Quality in Teaching Reform

In 2018, the concept of "First-class Courses" to improve the quality of course teaching was first proposed, and then universities across the country took this as an opportunity to vigorously promote teaching reform and "First-class Courses" construction. The purpose of the "First-class Courses" is to cultivate high-quality talents, and teaching innovation is the source and motivation for lecturers to carry out the "First-class Courses" construction. Junior lecturers in the adjustment stage (take office for 3-5 years) have accumulated some teaching experience, and their education and teaching level and classroom management quality are gradually rising. They actively participate in teaching reform, rapidly enhance the professional quality of junior lecturers in the construction process of course, actively explore diversified teaching methods, break through current teaching contents and teaching design, master advanced teaching concepts, and improve their teaching innovation quality. With the advantages of Internet information technology and age characteristics, junior lecturers are more receptive to diverse teaching methods and teaching ways in the teaching reform, and can adapt to the changes in teaching mode more quickly, and can also better use new teaching methods and information tools in the process of specific teaching practice. In the process of teaching reform, junior lecturers should, while pursuing innovation in teaching methods (such as courseware production and innovative teaching forms), pay attention to the logic and systematicity of teaching contents, pay attention to highlighting the key points of course teaching while enriching teaching contents, and become an effective leader and firm implementer of teaching reform in colleges and universities.

Junior lecturers can further realize the importance of cultivating talents' ideological and moral culture as well as theoretical knowledge level and practical skills in the study of the spirit and

documents of teaching reform activities. In addition, junior lecturers realize systematic innovation of teaching methods and teaching contents under the leadership of teaching reform, not only presenting systematic and theoretical teaching contents in a variety of new teaching methods, but also ensuring the fit between teaching contents and teaching methods, providing diversified teaching activities for student subjects, and also realizing effective improvement of teaching quality of their own in the process.

6. Integrate Discipline Frontier into Basic Teaching

Engineering Chemistry is a public basic course, and there is inevitably a gap between the content of the reference textbook and the current academic frontiers and hot spots. Junior lecturers have strong research quality and international horizon. In order to keep students abreast of the latest knowledge hotspots, enhance their interest in learning and stimulate their enthusiasm of learning, lecturers should pay close attention to the latest scientific research results in hotspots field such as energy, environment, life and materials, which are the most important concerns of today's society, and let students feel the power of science and its development by combining classroom guidance with application examples. For example, when teaching the chapter of the principles of electrochemistry, students should be guided to consider the advantages and possible problems of new energy vehicles in the form of group discussions in close connection with the current principles and market of new energy vehicles, and propose feasible solutions in connection with what they have learned. In addition, junior lecturers can combine their own and our university's scientific research results and characteristics, bring the frontier of science and scientific figures around them into the classroom, and make students understand the basic rules of scientific research activities and master the basic methods of scientific research by explaining to them the ideas and methods in the research process. The quality of education is the lifeline of colleges and universities, and the combination of teaching and scientific research is the fundamental way to cultivate high-quality talents and produce high-level scientific research results; the positive interaction between scientific research and teaching will be very helpful to cultivate high-quality undergraduates and provide a large number of excellent professional talents for modern innovation and entrepreneurship.

7. Conclusion

The development of junior lecturers is directly related to the quality of higher education in China, and the improvement of their own quality is the driving force of their development. Junior lecturers should make full use of pre-employment training and teaching training to establish the educational consciousness of strengthening moral education and cultivating people, master advanced teaching quality, keep the original aspiration, strictly require themselves and cultivate personal culture; actively participate in teaching competitions and teaching reform, combine advanced disciplinary frontiers, take advanced teaching concepts as guidance, enrich classroom content and improve educational and teaching quality. The growth of junior lecturers is a long-term process of learning, practicing, introspection and improving. Junior lecturers should take advantage of their own strengths, make full use of various educational and teaching resources, and strive to improve their teaching level and comprehensive quality, so as to cultivate more excellent reserve talents for the country.

References

- [1] Li Qiurong, Xie Danyang, Wang Yanzhi. (1999). About Yanshan University's Reform in Teaching Engineering Chemistry. *Research in Teaching*, 22, 4, 243.
- [2] Qiao Yuqing, Xie Danyang, Li Qiurong, Gao Faming. (2010) Discussion on improving academic self-efficacy in engineering chemistry teaching of fine curriculum. *Research in Teaching*, 33, 6, 55.

- [3] Qian Cunwei, Wang Yanqing. (2022) "Course Ideology and Politics" Leading Fine Chemical Experiment Teaching Reform, *University Chemistry*, 37, 3, 5.
- [4] Wu Qingyun, Xie Chenmin, Gao Shuxian, Huang Yixuan, Wu Wenjie, Qiang Jiayu. (2022) A Novel Model of Innovation Education Based on Steam+ Education Concept. *Curriculum and Teaching Methodology*, Vol. 5, 80-88.
- [5] Zhiwen Tang, Rongjun Zhao, Fang Bian, Ying Lin. (2022) The Effect of College Teachers' Innovative Classroom Teaching Behavior on Learning Engagement: the Mediating Effect of Teaching. *Curriculum and Teaching Methodology*, Vol. 5: 37-43.
- [6] Songyu Yang, Xiaoling Liao. (2022) Exploration of innovation of experimental training management in higher vocational colleges. *Curriculum and Teaching Methodology*, Vol. 5: 58-66.
- [7] Meng Xianghai, Huang Xingliang, Xu Jian, etc. (2018) Cultivation of Engineering Design Ability of Young Teachers in Chemical Engineering Major. *Education Teaching Forum*, 000, 014, 73-75.
- [8] Li Ying, Liu Songqin. (2011) Discussion on Teaching of Engineering Chemistry and Cultivation of Innovation Ability. *University Chemistry*, 26, 4, 3.
- [9] Chunguang Wang, Aiju Li. (2022) Research on Teaching Mode Reform of Practical Training Courses in Higher Vocational Education. *Curriculum and Teaching Methodology*, Vol. 5: 126-131.
- [10] Lian CHEN. (2021) Analysis and Enlightenment of American Ap Chemistry Curriculum Framework under International Background. *Curriculum and Teaching Methodology*, 4, 29-34.
- [11] Xia Meirong, Tian Hua, Wang Jing, Zhong Chunmei, Li Zhiping, Jiao Tifeng, Li Yuan, *Guangzhou Chemical Industry*. 2022, 50,215-216.