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Unveiling the Crossroads: Reflections on Teaching Chinese Master's Students in Chemical Engineering Labs

Ya He

Department of Chemical and Biological Engineering, University of Sheffield

Ya He

PhD Candidate, Department of Chemical and Biological Engineering, University of Sheffield
yhe81@sheffield.ac.uk

I am a PhD student in Engineering Education from Sheffield. My PhD research is focused on investigating overseas students' learning experience in engineering master programmes at UK universities. Before joining the Department of Chemical and Biological Engineering at the University of Sheffield, I worked as an educational consultant in China. Alongside research, I worked as a graduate teaching assistant (GTA) in clean energy, gas boiler and thermodynamics labs in the Faculty of Engineering. Also, I joined a research group of inclusive research culture in the Department of Electronic and Electric Engineering in Sheffield.

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Abstract

In recent years, the number of Chinese students enrolled in one-year postgraduate taught (PGT) programmes in UK universities has continued to increase, making graduate teaching assistants (GTAs) need to teach in a more international and diverse classroom environment. Such changes have impacted students' learning expectations and the GTAs' teaching experiences. Therefore, this reflection paper is based on my personal experience as a GTA to discuss the current situations and problems of teaching PGT students in engineering and provides insights for PGR teachers involved in teaching based on classroom observations and teaching reflection.

Keywords: Chinese students; postgraduate taught programmes; graduate teaching assistants; Higher education.

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Chinese students at UK universities

Chinese students are the largest cohort of overseas students in the UK, especially those enrolled in one-year postgraduate taught (PGT) programmes (Universities UK, 2022). They have brought significant socio-economic benefits and cultural development to British local communities (Hillman, 2021). However, due to the differences in education and cultural backgrounds between China and Western countries, they will face difficulties in adapting to the Western educational environment and mode (Wu and Hammond, 2011). The academic performance, learning experience and cognitive abilities of Chinese students in Western universities have also aroused the worldwide interest of education researchers (McMahon, 2011; Gu and Maley, 2008). Due to differences in language, culture and behavioural habits, Chinese students usually feel challenged to adjust and adapt to changes in the external environment quickly (Andrade, 2006; Gareis, 2012; Cheng and Erben, 2011), which may lead to their failure to achieve the expected academic performance (Anderson, 1993; Rao and Lei, 2014). Consequently, for Chinese students to survive in Western classrooms, they have to spend more time exploring, learning, changing and developing their own learning styles and strategies (Wang and Byram, 2011).

Chinese PGT student in Engineering Practical Labs

In the CPE6311 Applied Energy Engineering teaching labs (a compulsory PGT module for MSc Environmental & Energy Engineering and MSc Environmental & Energy Engineering with Industrial Management at the Department of Chemical and Biological Engineering in Sheffield), most of the students enrolled in this module are overseas students, and most of these overseas students are from China. Classroom interaction is a necessary element of a practice-based classroom in higher education, but based on my observations what I have seen is that there are some limitations to student-instructor interaction in the PGT lab sessions. For example, Chinese students were hesitant to answer the teacher's questions and needed more time to think about the appropriate answers during the question-and-answer (Q&A) session; and Chinese students preferred to use Chinese to communicate with each other in private rather than discussing or asking questions with the instructor.

In a chemical engineering lab session, students are typically required to work in small groups. Regarding the performance of Chinese students in a group, I found that some Chinese students showed a high learning initiative, and these students were willing to actively participate in teaching and learning activities regardless of their English proficiency. If the entire group consists of Chinese students, there will usually be one or two students representing the group and often interacting with instructors, while the others will remain relatively silent. Whereas the silence I am mentioning here is limited to when communicating in English, these students show more initiative when communicating in Mandarin within the group.

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Compared with the group of Chinese students, the group composed of Chinese students and other students will form two other modes of interaction within the group. In the first case, all students cooperated well with each other no matter where they came from. As a result of this mode, a more positive learning initiative and attitude can be promoted within the group, and all students are more willing to participate in teaching and learning activities. In the second case, the students from different backgrounds remained a certain distance from each other and formed several sub-groups within the group. In this kind of group, learning activities were carried out in sub-groups, and usually, only parts of the students interacted and communicated with instructors and GTAs.

Another observation from the lab session was that students were increasingly using digital devices and technologies (such as smartphones and tablets) in the classroom as platforms to access learning resources. However, for Chinese students, I found that the digital technologies they mostly use are translation apps. They will use these translation apps to translate the English material directly into Chinese. This digital support may make it easier for overseas students to adapt to bilingual learning. But it also raises additional questions for overseas students. If they study in their native language at a Western university, their English learning process may be affected, and whether this effect facilitates or hinders the learning remains to be explored in the future.

Problems Faced by GTA in Teaching Overseas Students

For most Chinese PGT students, the language barrier is the first problem they must overcome. Although they are required to provide proof of language proficiency qualification such as the International English Language Testing System (IELTS) test, before entering a UK university, passing such a general English language proficiency test may not fully represent that an overseas student has the academic English skills to conduct professional learning and research in academia (Clark and Yu, 2020). Through my classroom observation, the reality is that the English level of Chinese students participating in practical labs varies. For example, some students were able to express themselves to the instructor fluently in English, but some were unable to even understand a question like, "Did you preview the course material and complete the pre-lab activity in advance?" In actual teaching, the limited language ability of these PGT students makes it difficult for instructors and GTAs to teach complex concepts to them effectively. From the perspective of students, they sometimes cannot accurately express their problems and have doubts about the course progress, further leading to misunderstanding, affecting their classroom engagement, and learning experience.

Moreover, through my classroom observations and conversations with Chinese students after class, I found that most Chinese students entering this PGT programme completed their undergraduate studies in China. These students also said that studying in a British classroom made them feel that the culture and style of Chinese and Western education are different. Because education in China is mostly passive, it makes these students more

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accustomed to passively receiving knowledge rather than engaging in interactive discussions with their educators (Watkins and Biggs, 1996). Thus, it would also make most of them unable to understand and meet the course requirements of UK universities in a short period of time due to these cognitive differences in learning and teaching. This is especially true in the case of UK master's degree programmes, which often last only one year, making it challenging for Chinese students to quickly get used to and develop Western learning behaviours. In addition, according to the students' post-course feedback I received, the Chinese students indicated that they had not received any courses or training related to explaining the learning requirements or marking criteria expected in the Western education system. This also may lead to a big difference between what they expect from their learning and what they actually get. Thus, considering from a GTA's side, we need to understand the differences and doubts that Chinese students will experience in Western classrooms in advance to minimise miscommunication and adjust teaching strategies to meet the different learning needs of various students.

As a GTA in laboratory teaching courses, in addition to teaching and guiding students to learn and practice the corresponding knowledge and skills, we need to form our teaching strategies through teaching practice with various overseas students. GTA is also one of the main teaching participants in the class, so we should pay more attention to improving our communication and expression skills and make sure they are clear and concise enough for different students. It is indeed challenging to teach better as GTAs, but we can also introduce new technology (such as visual aids and AI technologies) to help us improve the quality of teaching outside of simply lecturing or demonstrating.

Reflections on Teaching in Chemical Engineering Labs

To ensure that all students have a successful laboratory experience, instructors and GTAs should provide clear learning guidelines and create a conducive learning environment to maximise practical engagement and learning outcomes. Before the lab session begins, for instance, it is necessary for instructors and GTAs to establish clear teaching expectations and goals for students to achieve while also checking the learning progress to ensure that students understand what is expected of them. In addition, we can also create a supportive and welcoming teaching atmosphere to the extent of our ability (which, as a GTA, requires a willingness to do more or not depending on our working hours, teaching style and personality), encourage students to ask questions and engage in activities and discussion. Then, when the lab teaching takes place, GTAs can engage students by asking open-ended questions that facilitate them to think critically about the learning materials. However, in the aspect of critical thinking, Chinese students may not be familiar with this learning skill (Fakunle, Allison, and Fordyce, 2016). Thus, GTAs can provide some examples appropriately or participate in the students' Q&A interaction to lead their thinking. Then, moving into hands-on activities and experimental operations, we should provide practical opportunities that correspond to the concepts being taught as much as possible and encourage students to work in groups and cooperate with peers. Moreover, students' passion for participation and interest in learning could be maintained and

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improved via timely encouragement and guidance. Also, by forming and participating in groups, students can learn from each other, share their knowledge and ideas, and develop essential teamwork skills. For example, using the Belbin Team Role test to help students foster effective communication and improve collaboration by identifying each team member's distinct roles and contributions to the team's success (Aranzabal, Epelde and Artetxe, 2022), consequently leading to more effective learning outcomes.

At the end of the lab session, the instructor and GTAs can try to provide summative feedback and constructive comments to help students improve their understanding of the learning materials and review their performance during the lab work. As far as possible, we can also provide specific feedback for students on areas for improvement and suggest additional resources to further their self-study afterwards. For example, in collaboration with the module leader, I designed simple post-session questionnaires to ask about students' perception of how much course content was learned and in what areas they expect us to improve, as well as finally informing students of how and when they can get in touch with the instructor and GTAs for follow-up feedback. Within the scope of GTA responsibilities and working hours, providing feedback to encourage students to reflect on their own learning, as well as sharing practical experiences for them to relate to the practical implications of their future careers, can help enrich the overall learning experience of overseas students.

Conclusion

In the classroom of Higher Education, it is vital for educators to develop an understanding of cultural and linguistic differences that exist within the student cohorts to teach effectively. By recognising and appreciating these differences, teachers and GTAs can adapt their teaching approaches and techniques to reach Chinese students as well as other overseas students effectively. To accomplish this, we can adapt and implement targeted teaching strategies and assistive technologies according to different students' learning needs and backgrounds. Additionally, as GTAs, in addition to continuously upgrading our teaching skills, developing the skills of classroom management and engagement is equally critical to our personal growth. By effectively managing classroom dynamics and engaging students in the learning process, we can create a positive and productive learning environment for various students to improve their overall learning experience.

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