An Autoethnography Study of Using Critical Pedagogy to Teach an Introductory Course of Engineering Education to Chinese Graduate Students Majoring in Education*

XINRUI XU

School of Education, Huazhong University of Science and Technology, 1037 Luoyu Rd, Wuhan, Hubei, 430074, China.
E-mail: xuxinrui@hust.edu.cn

This is an autoethnography study of my experience teaching an introductory course of engineering education to a group of Chinese master's and doctoral students majoring in education. After getting my Ph.D. in engineering education from the U.S., I returned to my home country China and started a faculty job at a research-intensive university where engineering education is an emergent discipline. In this critical reflection, my analysis focuses on a few facets of my experience implementing critical pedagogy, including my transnational training background, adjustment to the power distance between the students and me, and my emotional and cognitive growth. Lastly, I want to discuss the caveats of using critical pedagogy and share some potential strategies, hoping to provide a reference for other teachers in similar cultural contexts.

Keywords: autoethnography; critical pedagogy; graduate-level introductory course; transnational

1. Introduction

After studying and working in the U.S. for nine years, I returned to my home country China and took a faculty position focusing on Engineering Education at a research-intensive university. Engineering education is an emerging discipline in China, but it is yet established [1, 2]. My credential as a graduate of Purdue University's engineering education program earned me the opportunity to design and teach a new introductory course on engineering education in our school. This teaching experience profoundly facilitated my professional development regarding cultural and teaching competencies.

Unlike undergraduate education, graduate education requires students to become creators of knowledge instead of consumers. However, due to cultural influences, many Chinese students hold a strong hierarchical belief when interacting with faculty in academic settings, indirectly impeding their growth from becoming knowledge creators. Often, I witness intended discussions turning into one-way communication where professors take over the space, and the students become silent. Both sides take this power dynamic for granted and readily accept the missing component of dialogues. Students hold back their thoughts and retreat to a passive receiver position. Although this phenomenon is also seen in other contexts, it is particularly common in eastern Asian cultures [3].

Getting my graduate training in the U.S., I got used to being treated as a junior researcher instead of a pupil. I shared my thoughts with professors and got constructive feedback on my immature opinions, with a safe feeling that I would not get mockery or personal attacks. Despite the power difference between professors and students, I was lucky to have professors empowering me that I should not dismiss my immature ideas but work hard to make them robust. I internalized the love passed on to me from my professors and believed that good professors should always empower their students. While being a doctoral student, I worked concurrently as a counselor at the university career center. My counseling training and practice taught me that giving the voice back to students is foundational to a healthy helping relationship. Through listening to hundreds of students' stories, I gained valuable insights into gender issues in engineering, problems with the engineering curriculum, engineering students' major and career choices, and more. Thanks to those experiences, I was more than ready to embrace the constructivist perspective in teaching and learning, and I developed a passion for engineering education research through empathizing with engineering students on the key issues they face in their journey.

I wanted to provide a similarly positive learning experience to my students. I hoped they could develop a genuine interest in engineering education research and identify ways they can contribute as a part of the community, whether in the role of knowledge consumer or creator. When contemplating the course design, I wondered what it would be like if I used critical pedagogy, honoring students' agency as learners and inviting them to co-construct knowledge [4, 5]. I was curious to hear what the students could offer on the various topics in engineering education. Meanwhile, I had significant

concerns about this tryout: would this effort be a step forward in graduate-level education, or would it become an epic fail due to negligence of cultural compatibility between the student-emancipation approaches and the oriental culture of the teacher-student dynamic? When neglecting cultural fit, critical pedagogy can bring unintended outcomes; quoting Trahar, "Seeking to dismantle or dismiss the authority vested in me [the teacher] can be threatening for those students who are more familiar with positioning the academic as an authority figure [6, p.14]."

2. Methodology Choice of Autoethnography

As a junior faculty, I understood the vital role of publication in my career under today's neoliberal higher education system [7]. Still, I could not resist a strong desire to advocate for student-centered teaching practice, which likely requires significant commitment. I constantly negotiated my work priority across research, teaching, and service. Going through rounds of internal debate, I found myself devoted to challenging the existing teacher-student dynamics in the graduate-level classroom, so I decided to use critical pedagogy for this course. Along with teaching, I wanted to conduct rigorous research, advance teaching scholarship, and share my findings. Autoethnography became a well-fit method because it allowed me to use my personal experience to illustrate facets of the teaching process for both cultural insiders and outsiders so that I could provide perspectives that traditional research neglects [8, 9]. My first brief encounter with autoethnography was in my advance qualitative methodology class. I found it captivating but did not probe further. Later, I sat in Dr. James Holly Jr.'s dissertation defense on his experience teaching black boys engineering as a black man [10], where I experienced the soul-touching potential of autoethnography work and its power to address social justice concerns. I particularly loved the evocative facet of autoethnography that validates the feeling of readers with similar experiences, and makes personal and social change possible [9].

Using autoethnography, I desire to further examine the complex culture-infused student-teacher relationship under critical pedagogy and the multilayers of the teaching experience for a transnational scholar. Personalized research like this can shed light on important topics in engineering education research that are not easily discussed through quantitative methods or are too challenging to collect in-depth qualitative data, such as social justice concerns and the competency development process. I consider autoethnography a method that empowers myself as a research tool to "foster transformative learning and teaching [11, p.217]."

Hughes et al. mapped attributes of autoethnography with AERA publication standards and claimed its legitimacy as a rigorous research method [12]. Similarly, Wall and Holt discussed issues of representation, legitimacy, data quality, ethics, and evaluation criteria of autoethnography [13, 14]. Those works guided me in the writing process to constantly reflect on the quality of this work. Wring autoethnography is both easy and difficult. I experienced a constant struggle when writing this article, questioning the representation of my story and its academic value. I see the struggle as a vulnerability and a strength of this work. The vulnerability comes from the fact that I was not an expert on critical pedagogy, so I never ceased questioning my credibility in writing about it. Meanwhile, this paper is valuable because it could show authentic challenges a faculty might encounter when adopting critical pedagogy. I hope this work can validate the feelings and concerns that other faculties face in their careers.

The data used to support writing up the story came from my reflective notes. Following the guidance of Poulos [15], I regularly wrote reflective notes on my experiences, ideas, regrets, and takeaways during this teaching experience. Besides those, I wrote reflectively when I read about critical pedagogy or had thoughts on my professional development as a transnational scholar. A total of 27 note entries were collected during the three months of preparing and teaching the course (Late April to July). In addition to using these notes as the main data source for this study, I consulted artifacts such as students' writing assignments and documentation of the in-class team projects to support my analysis and writing.

3. Guiding Frameworks for my Reflection

When I started to plan for this study, I asked myself what theoretical framework guides my reflexive thinking and practice. Critical pedagogy came to my mind for its emphasis on learners' agency and emancipation [5]. In addition to critical pedagogy, I also borrowed techniques from active learning, which were coherent with my previous training in group counseling. Then I pondered my positionality as a teacher and researcher. It turned out that being educated in China and U.S during my adolescence and young adulthood played an important role in shaping my understanding of teaching. Transnationalism, a long-existed and evolving concept that studies economic, social, political, and religious links across nation-state borders, was an appropriate framework to understand my teaching

experience as a junior faculty who had just returned to the home country [16]. In this study, critical pedagogy and transnationalism are the guiding theoretical frameworks for my reflection.

3.1 Critical Pedagogy and Active Learning

Critical pedagogy sees education beyond transmitting knowledge from the teachers to the students, but as a tool for empowering students from different cultural backgrounds to transform knowledge into action and emancipating those who are oppressed [4, 5, 17]. Under critical pedagogy, teachers encourage learners to take ownership of their learning experience and see themselves as creators other than consumers of knowledge. With a similar focus, active learning is a student-centered educational approach where students engage in learning, do meaningful activities, and reflect on their learning [18]. Both critical pedagogy and active learning value students' engagement and agency. Inspired by Zepke's socio-cultural ecosystem of student engagement and Lombardi et al.'s curious construct of active learning [19, 20], I view student engagement as authentic participation in the learning process behaviorally, cognitively, and emotionally. The agency view of students acknowledges their individual and collective strengths to learning, including their cultural, educational, character-related strengths, and much more [4, 20, 21]. In research works and how-to guides, class techniques used to facilitate student engagement and agency include problem-posing dialogue, transformational reflection to action, concept mapping to replace didactic lectures, group creation of graphical representations of readings, think-pair-share, and more [17, 20, 22].

Educators embrace critical pedagogy for its promise to address social justice issues that traditional passive lectures cannot. Meanwhile, scholars also acknowledge the concerns about its implementation [17]. It challenges the belief and habits of many students, teachers, and other stakeholders to realize that the traditional one-way flow of knowledge might not work well [3, 6]. For example, an emancipatory pedagogy could create anxiety for students, and they don't feel comfortable voicing their thoughts in a classroom setting. Also, not all teachers have the intention and resources to move away from traditional teaching and adopt pedagogies that require a mindset shift and extra training. Relinquishing authority can be foreign and insecure for those involved in the teaching and learning process [22, 23]. As teachers, we must stay alert and reflexive that critical pedagogy in various cultural environments may present itself differently. A mechanical implementation of critical pedagogy is "at best counter-cultural for many people and at worst dismissive of their traditions [6, p.14]." Active learning represents a similar but different approach to critical pedagogy, but differentiating their differences is beyond the scope of the current study. In teaching the course and writing up this article, I took an elective stance to pick and use techniques that were appropriate for my teaching.

3.2 Experience of Chinese transnational Scholar Returnee & Engineering Education as a New Discipline in China

Transnationalism captures the global interconnectedness of people, places, and institutions crossing national borders [16]. China has been one of the largest sending countries of international students since around 2010; many students choose to return to China after graduation, including doctorate degree owners who seek academic positions [24]. Studies of transnational scholar returnees in China point out that this population's career development is complex and influenced by political, economic, and cultural factors [25–27]. Many studies of Chinese returnee scholars' career achievement focus on research productivity and other economic return, such as social mobility (e.g., [26]). In comparison, only a few studies provide insights into the teaching experience of these scholars. Chen [7] elaborates on innovation brought by transnational scholars to Chinese higher education, showing that they do not just bring "knowledge and skills" but also "philosophies and practices." Chen's findings suggest that student-centered teaching innovation aiming at reducing the power distance between students and teachers resulted in mixed outcomes. On the one hand, practices like seminar classes in graduate-level courses increased students' critical thinking and active learning behaviors, thus creating positive and influential change on the institutional and individual levels. On the other hand, some professors received negative feedback for not using the lecturing style or for providing a comprehensive but heavy learning plan. These negative experiences might discourage professors from initiating localized teaching innovation due to competing work priorities between research and teaching.

Engineering education is an emerging field in China, mostly viewed as a branch of higher education. Different from the emergence of engineering education programs in the U.S., which was driven by engineering educators and engineering education researchers [28], the discipline of engineering education in China emerged in response to a series of national educational reforms. Using the framework representations of engineering education research [29], engineering education research in China has not reached the fourth level of "rigorous research in engineering education," judging by the

type and focus of publication in the flagship journal of Research in Higher Education of Engineering [30]. The policy-driven emergence of engineering education research leads to abundant opportunities for engineering education researchers to work together and define engineering education research in the Chinese context. Inviting more graduate students to gain interest in engineering education helps build a talent pool of future engineering education researchers. I want to contribute to the development of these future researchers who could perform culturally aware engineering education research.

4. The Teaching Experience – Worries and Growth

At the intersection of the transnational experience and critical pedagogy is a key concept: power distance [7, 31]. Power distance describes "the extent to which the less powerful persons in a society accept inequality in power and consider it normal [31, p.307]." As a junior faculty, I balance teaching and research carefully, trying to fit into the neoliberal higher education system's expectation for an early career faculty. Meanwhile, as a teacher, I am committed to reducing the power distance between the students and me. In the classroom, I explicitly encouraged the students to share their thoughts and destigmatized the shame of having a "not perfect answer." I often found myself saying, "I don't have an answer for that either, but here are my thoughts on . . ." This modeling behavior made me look less" knowledgeable" but more relatable to the students. After all, engineering education is still a developing field, and many important issues continue to evolve. By creating an environment where all genuine answers are respected and welcomed, we became more equal partners in the journey of learning and creating knowledge. Despite power distance, we somehow co-developed a space where students' genuine voice was promoted and valued. I liked asking follow-up questions to help students think more critically in class and in the feedback for their writing assignments. When students answered questions, I offered constructive feedback and probed further instead of providing an evaluative comment. Throughout the course, I posed questions more often than I gave answers, hoping the support the cognitive autonomy of my students [32]. Regardless of the benefits, challenging the traditional power distance in the classroom made both parties vulnerable. I constantly worried about being viewed as "not competent," and the students had doubts about the usefulness of the course when they didn't get a definite answer to questions they raised.

Here is a brief overview of course enrollment, content, and logistics to provide background information on the course design and delivery. The class comprises 19 master's and doctoral students from higher education and psychology programs. The course was a designated master's level elective course in the plan of study, so all seven doctoral students and two master's students took the course through auditing for personal interest. The auditing students agreed they would fully participate in every session before being granted permission to join the course. Some students had experience researching engineering education topics, some were interested in exploring the topic, while some chose the course to fulfill their elective credit hour requirement. The class met regularly on Friday mornings for four hours across eight weeks. We covered four main themes, including what is engineering education and engineering education research; curriculum, teaching, and professional competency in engineering education; engineering education in a global context; contemporary issues in engineering education. A few online platforms were instrumental in facilitating the learning activities regarding communicating logistics and assignments, hosting reading materials, posting students' weekly reflections, and assisting anonymous discussions in class.

4.1 Preparation and Course Delivery – A Balance Between Depth and Breadth

I was excited but also nervous when I knew the course had been approved as a graduate-level elective course. I was the first faculty member with a degree in engineering education in our school, and my colleagues expected me to have the expertise to contribute to developing engineering education teaching and research. However, as a junior faculty, I did not have the confidence to claim I knew engineering education research well. A strong sense of imposter syndrome overwhelmed me while I started planning for our school's first graduate course in engineering education.

I reached out to my Purdue ENE professors for support. From empowering conversations with a few mentors, I learned that a graduate-level course usually permits flexibility, and I could make calls on the course design. The encouragement comforted me when I debated what content to cover in the course. When I got anxious about deciding the content and format, I told myself that my course did not need to follow the same style as other faculty in the school, and I could try new pedagogy as I saw fit. Also, I realized that I might not have in-depth discussions on the course design with other faculty around critical pedagogy because it was not a widely embraced teaching approach in our school,

if not the overall higher education system in China. For the big and small decisions, along with designing, teaching, and evaluating the course, I needed to make judgments and take risks.

Time flew by, and the class started. I used the scaffolding technique to teach students how to learn in an active learning environment, such as how to approach class discussion and teamwork, how tools like learning objectives and rubrics can facilitate learning, how to write reflectively and critically for class reading materials, and more. In between classes, I asked the students to read book chapters and write weekly reflective journals. In the weekly writing assignment, I posed a specific requirement for the students to "talk" to the reading, just as Freire suggested that students need authentic interaction with the readings. During class, students worked in groups to introduce a concept to the whole class, synthesize and present research findings on their selected topics, discuss skills in learning and research, and more.

We also discussed thinking tools like boundary, classification, and systems thinking and reflected together as a class on how these tools facilitate our understanding of issues in engineering education. I adopted course objectives from the syllabus of my doctoral classes, expecting students to develop a critical view of engineering education and engineering education research. Building upon those cognitive outcomes, I incorporated learning activities on communication and teamwork competencies for them to maximize gains from critical pedagogy, such as active listening, public speaking, and providing constructive feedback for others. More importantly, I wanted the students to develop confidence in expressing their ideas and embrace diverse thoughts and solutions to seemingly straightforward questions.

Over the eight-week course, students made new connections with their peers and confidently shared their thoughts on some engineering education topics. Though the class did not cover any topic in great depth, the students added new building blocks to their understanding of engineering education, monitored and reflected upon their learning process, gained confidence in constructing their knowledge system, and developed some epistemological curiosity.

4.2 No Script Available – Constantly Making Decisions As an Instructor

Critical pedagogy and active learning require the instructor to have a different mentality toward teaching than the lecturing style. Through this reflective teaching practice, I observed various decisions to make in preparing and teaching a course. When making these decisions, a teacher needs to thoroughly understand the course materials and what the students already know about the topic. I did not have a solid plan to assess students' prior knowledge, so I mainly relied on observing students' reactions in the classroom to adjust my teaching. I vividly remember debating multiple times whether I should further an ongoing discussion at the cost of not covering the rest content planned. Since the students were from different degrees and programs, I was also very conscientious and tried to ensure the materials fell under a proper zone of proximal development so that the students could engage and make progress without feeling too stretched.

A major challenge in designing this course is that all but one student in the class has an engineering background. So I created a list of online clips demonstrating various engineering processes, such as manufacturing and designing. During the first few classes, we will watch these videos together. Using those videos as prompts, we discussed our prior understanding of engineering and collectively constructed our perception of the various aspects of engineering activities. Even though our list was not in a comprehensive textbook style, it was authentic and relatable to the students. This component increased the students' engagement with the course content, shown through their weekly reflection writing.

Metacognitively, I reflected upon my decisions of three layers in the preparation and delivery of the course. The first layer of decisions is high-level decisions, such as the major topics covered in this class, time allocated for each topic, the formality of homework, the plan for the final assessment, and class rules to encourage participation. The middle layer decisions pertain to strategies to ensure the implementation of the above higher-level decisions. For example, in each class, I would first decide on the learning objectives of the four-hour session, then decide on the supplement reading materials and other resources that students can use as references. Once the objective and content were set, I started to design group activities and map them with students' competency development. In the activity designing stage, I would revisit the content plan to ensure that I would design a lecture component to supplement the activities. In preparation for the lecture component, I needed to watch my pace and create regular pauses with question-posing, polling, and other brief interactive activities. Also, I ran a final check so that the lecture and group activities were coherent with the theme topic covered in each session.

The third layer of decision is the more micro-level decisions made during the class. In the class, I would gauge students' level of engagement. If the

students seemed bored, I encouraged them to ask a question about the class topic and share what they wrote about this topic in their weekly reflection assignment. There were decisions made based on my observation of students' interactions. For example, some students got nervous when invited to share their thoughts with the whole class or felt lost when I did not give an evaluative comment on their answers. I would guess the cause of those negative emotions and provide a space to process those experiences by having an impromptu discussion. When the content covered seemed too easy for a certain group of students, I would invite them to teach the topic to others in the room, hoping they could gain a sense of accomplishment and develop their communication skills.

4.3 A Room Filled with Performance Anxiety and Uncertainty

At the beginning of the first two sessions, I normally posed some light questions to elicit student interaction and increase engagement. However, I felt I barely nailed the "light questions," which were supposed to be easy and inviting. Whenever I posed a question and expected some shout-outs from students, the room often went silent for a while. Eventually, there might be one student who decided to break the awkwardness and provide some thoughts. More likely, I had to jump in and answer the question myself. From my counseling training, I knew that in one-on-one settings, silence in the room is not necessarily negative since it provides space for the clients to facilitate reflection, take responsibility, and prepare for what to say [33]. However, it was different in a classroom where silence flowed to every corner because both the students and I felt the room was filled with anxiety and indifference. The longer the silence, the more students got impacted by those emotions. Eventually, we all felt unease.

I slowly gained some insights into the issue of in-class interaction after chatting with students after class. More than one student told me in passing that they worried about being unable to provide the "right" answer to a discussion question. They acknowledged that I clearly stated that "there is no right or wrong answer, but you want to show your thought process and share your opinions critically." Still, this fear of "I am not ready to answer and convince everyone that I have valuable opinions" haunted the room.

Ironically, the self-consciousness did not just haunt my students but also myself. My anxiety came from not being able to judge the students' engagement level and learning progress. Our class was relatively small, with 19 students, but my group counseling experience taught me that a single group leader probably would not be able to attend to all participants equally when the number exceeds eight. And that was true because I found myself focusing more on the students who were willing to participate. I worried about not being able to remember every opinion or highlights students shared in their reflection assignments or class discussion. I was preoccupied with the fear that I failed critical pedagogy by leaving an impression that I was not listening attentively enough. My anxiety also came from not being able to quote or refer to the most up-to-date research findings on certain engineering education topics that the students would not respect me anymore. I had to constantly remind myself that I was co-constructing knowledge with my students and nobody would expect me to know everything.

The counseling technique of focusing on clients was helpful for me in overcoming anxiety. I told myself quite a few times before and after classes that this course was not about showing off and proving my knowledge and skills; it was about helping the students further their understanding of engineering education topics. More importantly, I wanted them to aspire to explore more about engineering education, and I wanted them to develop a genuine interest, whether applying research findings in practice or identifying topics they wanted to spend more time finding answers to. Focusing on the here and now, on students' needs in the classroom, helped me prioritize the students' learning, but not how I got judged. I wanted the students to feel that they were the center of the learning process. For the content we could not cover in the class, I provided references for students to check after class should they have an interest. When I became less concerned about covering everything, I focused more on encouraging the students to express themselves. The silence became less awkward, and we focused better on the discussion topic and the learning process. Less shame and more vulnerability somehow made us better learners and teachers.

5. Lessons Learned about Implementing Critical Pedagogy

I often ask myself, "Are the students learning anything from the course?" "Did I do enough/Did I fail to get them comfortable with ambiguity and open-ended questions?" "Would the students gain more from the class if I were providing a more positivist view of engineering education research?"

In the last class, I invited the students to share at least one major takeaway from the class. Some commonly mentioned themes are: complementing existing knowledge of engineering education and engineering education research; increased confi-

dence in public speaking; getting out of comfort zone and embracing challenges; critically reflecting upon readings and learning from peers with an open mind; identifying weaknesses in study habits and thinking skills; getting connected with peers and setting a base for future discussion and collaboration; wanting to apply active learning activities in future teaching practice. The above takeaways fall under four categories: (1) increased confidence in public speaking, teamwork, and other useful skills for research and practice; (2) expanded understanding of engineering education and engineering education research; (3) practiced critical thinking and reflective writing; (4) experienced technology supported active learning for effective teaching and learning. Although not everyone fully appreciated the course design, most students acknowledged that the course was engaging and furthered their understanding of engineering education.

This attempt to use critical pedagogy in teaching an intro-level graduate course of engineering education took me on a nervous but fulfilling journey. Retrospectively, I considered myself to have achieved the overall course objective – students gained some interest in engineering education topics. More importantly, from having conversations with students and reading their final writing assignments, I know I achieved a long-desired goal: to provide students with meaningful experiences in the classroom and help them develop transferrable competencies for professional growth. Still, there are many regrets. One is that I did not implement a systematic assessment plan to assess students' growth comprehensively. The other is not knowing how much content would be sufficient, so my sense of insecurity always made me plan for more content than needed. It was very awkward to joke in class with my students that "I failed to cover everything I planned for today, again," quite a few times. I wished I could better estimate the time students needed for each activity and discussion so that neither they nor I felt rushed in finishing tasks in the class. However, I guess uncertainty is common when opening the door to critical pedagogy.

5.1 Make the Learning Process Explicit through Scaffolding Group Project

Based on my observations and students' feedback, the collaborative learning process is a core element that makes the course more interactive and engaging. While collaborative learning is nothing revolutionary and has been adopted widely [34], students in the same classroom may have different understandings and prior experiences with teamwork. Making the implicit learning process explicit can help students focus on the content of the learning task rather than feel confused about the

procedure of the activity. This strategy is consistent with the principle of "learning the game of learning" that students are well-informed to manage their learning [35]. In teaching the introductory course, I found two techniques particularly helpful in bringing the students up to speed with collaborative tasks.

The first technique is to explain all class activities when they are first mentioned in the class. The explanation should help students understand how the activity can support their learning of the content, what competencies they can develop, and how they can fully utilize the activity for personal growth. For example, I designed a few related group experiences throughout the semester. The first activity was very open-ended, so I offered some prompts for them to think about the activity process. I told the students to ask me any questions if they needed clarification. However, I had to pace around the class, checking on their progress before some students became empowered enough to ask me clarification questions on the activity. That was not a successful course instruction. I was hoping for the students to talk about engineering education through the lens of industry, occupation, or college major. Instead, we ended up with three mini-talks on the classification system, ethics, and history. Ironically, the activity outcome was fine because the students experienced solving an ill-structured problem first-hand. Through discussion, we reflected on how ill-structured tasks and lack of communication could lead to unintended design outcomes, which was transferrable to important issues in engineering education regarding engineering problem-solving [36].

Further discussion on the activity process revealed that when there was not enough explanation of the team tasks, students felt confused, and they might be afraid that they were the only person who did not understand the teacher's instruction. In later activities, I designed a more close-ended activity and drew a step-by-step guide to scaffold the process to accomplish the task. Interestingly, not all students followed the steps but considered the instructions clearer and easier to follow. I learned that a teacher needs to step into the students' role and envision the cognitive process assuming the students never have exposure to activities. This way, the teacher can list the stepwise process of the activity. The stepwise process could be used to help the instructor predict and adjust the activities accordingly to the students' needs on the spot.

The second technique is to discuss the understanding of the task and plans for problem-solving in groups before delving into the task. In one of the in-class team projects, we first took some time to

discuss teamwork and leadership. Students shared with their teammates their favorite experiences collaborating with others in academic, work, or personal life, as well as their most comfortable roles when working in a team. Then we invited a few teams to report their discussion briefly. Students felt more connected to their teammates and gained different perspectives on assuming leadership roles. The discussion naturally provided a space for the students to make informed decisions when delegating tasks in group projects. The students also agreed that spending ten minutes discussing teamwork made their collaboration more effective and enjoyable. This discussion also provided crucial information for me that most students in the class were uncomfortable taking leadership roles, and they always assumed that it was either the most senior or the most charismatic person who should take the leader's role. Thanks to this open discussion, I planned a brief explanation of various leadership styles and effective teamwork for the students in a later session.

5.2 Use Anonymity to Reduce Performance Anxiety

Some students may have the mindset that they need to be "correct" when answering a question in class, or they will be criticized. This might be more common in those cultures where the power distance between teachers and students is relatively high. Explicit verbal encouragement and constructive feedback provided on the spot are crucial for the students to perceive a low risk of sharing their opinions. Expectation plays a key role in the students' willingness to participate in class activities that require them to share. More specifically, students ask themselves the question, "can I perform well enough?" before deciding their level of participation in class activities. For example, in the mixed group of master and doctoral students, the seniority impacted the students' mindset of answering questions in front of their classmates. The senior students would be concerned about not living up to the expectations as "seniors," while the junior students would be concerned that their understanding of a certain issue was too shallow and not insightful. A nuanced dynamic like this could lead to a lack of voluntary participation when students are asked to speak in public.

Further evidence from discussions with students confirms that quite a few students told me that they felt good about sharing their opinion in public but needed much mental preparedness before speaking up. Think-pair-share and other instructional techniques that allow them to process their thoughts actively seem helpful for this mental preparation. In my class, I found the students responded well to the anonymous discussion board, where we used an online platform to show the aggregated answers to a question, and students could take their own pace to answer when given a reasonable time limit. After everyone posted their thoughts, we would spend a few minutes reading all answers, then invite a couple of students to share in public.

6. Conclusion

Reducing the power distance between the teacher and the students could yield emotional uncertainty on both sides, especially in a culture where hierarchy is expected in a classroom. When critical pedagogy is introduced to students who are used to lecturing style, the students may like it and hate it simultaneously, because the reduced power distance constantly challenge them to get out of their comfort zone, behaviorally and cognitively. Meanwhile, it provides students with meaningful learning opportunities that foster their competency development in constructing knowledge, communicating knowledge, and collaborating with others. For teachers who are used to the role of knowledge provider, the transition to a role of knowledge co-constructor and learning facilitator can be novel and confusing, even for those who are ready to embrace this role shifting. Co-constructing knowledge of engineering education with students who have little exposure to engineering requires the students to build personal and relatable connection to engineering activities. Critical pedagogy provides a less daunting way for this group of students to gain exposure to engineering education and develop intellectual curiosity based on their professional interest.

References

1. G. Zhu, On the study and reform of engineering education, *Research in Higher Education of Engineering*, (1), pp. 1–5, 2014.
2. D. Yu, D. Yuan and J. Yuan, How China's Engineering Education Research Moves to Institutional Development – Based on the perspective of international comparison, *Research in Higher Education of Engineering*, (3), pp. 173–180, 2021.
3. M. Kasuya, Classroom interaction affected by power distance, Language Teaching Methodology and Classroom, *Research and Research Method*, pp. 1–12, 2008.
4. P. Freire, *Teachers as cultural workers: letters to those who dare teach*, Westview Press, Cambridge, MA, 2005.

5. P. Freire, *Pedagogy of the Oppressed*, The Continuum International Publishing Group, New York, NY, 2005.
6. S. Trahar, Beyond the story itself: Narrative inquiry and autoethnography in intercultural research in higher education, *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 10(1), 2009.
7. Q. Chen, *Globalization and transnational academic mobility: the experiences of Chinese academic returnees*, Springer and Higher Education Press, Beijing, 2017.
8. C. S. Ellis and A. P. Bochner. Autoethnography, personal narrative, reflexivity: Researcher as subject., in *N. K. Denzin & Y. S. Lincoln (Eds.), Handbook of qualitative research (2nd ed)*, Sage, Thousand Oaks, CA, pp. 733–768, 2000.
9. C. S. Ellis, T. E. Adams and A. P. Bochner. Autoethnography: An Overview, *Forum: Qualitative Social Research Sozialforschung*, **12**(1), Art. 10, 2011.
10. J. S. Holly, *Of the coming of James: A critical autoethnography on teaching engineering to Black boys as a Black man*, Purdue University Graduate School, 2018.
11. K. Pithouse-Morgan, D. Pillay and I. Naicker, Autoethnography as/in higher education, in *T. E. Adams, S. H. Jones and C. Ellis (eds), Handbook of Autoethnography, 2nd Edn*, Routledge, New York, NY, pp. 215–227, 2022.
12. S. Hughes, J. L. Pennington and S Makris, Translating autoethnography across the AERA standards: Toward understanding autoethnographic scholarship as empirical research, *Educational Researcher*, **42**(6), pp. 209–219, 2012.
13. S. Wall, Easier said than done: Writing an autoethnography, *International Journal of Qualitative Methods*, **7**(1), pp. 38–53, 2008.
14. N. L. Holt, Representation, legitimation, and autoethnography: An autoethnographic writing story, *International Journal of Qualitative Methods*, **2**(1), pp. 18–28, 2003.
15. C. N. Poulos, *Essentials of autoethnography*, American Psychological Association, Washington, DC, 2021.
16. S. Vertovec, *Transnationalism*, Routledge, 2009.
17. C. Fobes and P. Kaufman, Critical Pedagogy in the Sociology Classroom: Challenges and Concerns, *Teaching Sociology*, **36**(1), pp. 26–33, 2008.
18. M. Prince, Does active learning work? A review of the research, *Journal of Engineering Education*, **93**(3), pp. 223–231, 2004.
19. N. Zepke, Student engagement research: thinking beyond the mainstream, *Higher Education Research and Development*, **34**(6), pp. 1311–1323, 2015.
20. D. Lombardi, T. F. Shipley, Astronomy Team, Biology Team, Chemistry Team, Engineering Team, Geography Team, Geoscience Team, and Physics Team, The curious construct of active learning, *Psychological Science in the Public Interest*, **22**(1), pp. 8–43, 2021.
21. N. Zepke, Student engagement in neo-liberal times: what is missing? *Higher Education Research and Development*, **37**(2), pp. 433–446, 2018.
22. P. J. White, I. L. Larson, K. Styles, E. Yuriev, D. R. Evans, P. K. Rangachari, J. L. Short, B. Exintaris, D. T. Malone, D. Davie, N. Eise, K. Mc Namara and S. Naidu, Adopting an active learning approach to teaching in a research-intensive higher education context transformed staff teaching attitudes and behaviours, *Higher Education Research and Development*, **35**(3), pp. 619–633, 2016.
23. K. Børte, K. Nesje and S. Lillejord, Barriers to student active learning in higher education, *Teaching in Higher Education*, pp. 1–19, 2020.
24. Q. Gu, An emotional journey of identity change and transformation: The impact of study-abroad experience on the lives and careers of Chinese students and returnees, *Learning and Teaching*, **8**(3), pp. 60–81, 2015.
25. Y. Gao, How transnational experiences and political, economic policies inform transnational intellectuals' identities and mobility: An autoethnographic study, *Higher Education Policy*, **34**(4), pp. 992–1009, 2021.
26. J. Jiang, K. H. Mok and W. Shen, Riding over the national and global disequilibria: international learning and academic career development of Chinese Ph. D. returnees, *Higher Education Policy*, **33**(3), pp. 531–554, 2020.
27. L. Lei and S. Guo, Conceptualizing virtual transnational diaspora: Returning to the "return" of Chinese transnational academics, *Asian and Pacific Migration Journal*, **29**(2), pp. 227–253, 2020.
28. P. C. Wankat, The emergence of engineering education as a scholarly discipline, in *ASEE*, Salt Lake City, Utah, 2004.
29. M. Borrego, R. A. Streveler, R. L. Miller and K. A. Smith, A new paradigm for a new field: Communicating representations of engineering education research, *Journal of Engineering Education*, **97**(2), pp. 147–162, 2008.
30. L. Ren and D. Yu, Research on the International Status and Influence of China's Engineering Education Research, *Research in Higher Education of Engineering*, (6), pp. 182–187, 2017.
31. G. Hofstede, Cultural differences in teaching and learning, *International Journal of Intercultural Relations*, **10**(3), pp. 301–320, 1986.
32. S. M. Lord, M. J. Prince, C. R. Stefanou, J. D. Stolk and J. C. Chen, The Effect of Different Active Learning Environments on Student Outcomes Related to Lifelong Learning, *International Journal of Engineering Education*, **28**(3), pp. 606–620, 2012.
33. N. Ladany, C. E. Hill, B. J. Thompson, B. J. and K. M. O'Brien, Therapist perspectives on using silence in therapy: A qualitative study, *Counselling and Psychotherapy Research*, **4**(1), pp. 80–89, 2004.
34. C. Crockett, C. J. Finelli, Mattdemonbrun, K. Anguyen, S. Tharayil, P. Shekhar and R. S. Rosenberg, Common characteristics of high-quality papers studying student response to active learning, *International Journal of Engineering Education*, **37**(2), pp. 420–432, 2021.
35. D. Perkins, *Make learning whole: How seven principles of teaching can transform education*, John Wiley & Sons, 2010.
36. D. H. Jonassen, J. Strobel and C. B. Lee, Everyday problem solving in engineering: Lessons for engineering educators, *Journal of Engineering Education*, **95**(2), pp. 139–151, 2006.

Xinrui Xu (she/her) is an Assistant Professor in the School of Education at Huazhong University of Science and Technology. She received a B.S. in electrical and computer engineering (China), M.S. in mental health counseling (U.S.), and a Ph.D. in engineering education (U.S.). Her research focuses on understanding engineering students' academic/career choices and their mental health, educational interventions that support students' transition from school to work, and multicultural and inclusive advocacy in engineering education. In addition to her engineering education and career development research, Xinrui has experience as a practicing career counselor for over eight years. Her personal experience as an engineering student, career counseling practitioner, and global citizen informs her current line of research projects.