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Summer Courses as a Platform for International Collaboration in Chinese Higher Education: An Exploration of Students' Learning Experiences

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Abstract

Higher institutions in China have seen increased international collaboration in engineering education. Among the increased effort to facilitate international collaboration, summer courses and programs have become a unique platform partly due to the flexibility they provide in time and formats. Despite its prevalence among leading universities in China as a key platform for international collaboration, students' learning experiences and outcomes remained unknown due to the lack of assessment efforts. This study aims to understand students' learning experiences through a student engagement survey and a learning environment survey. Also, follow-up interviews were conducted to explore the opportunities and challenges as related to these programs. Preliminary results implied active student engagement in their learning. Our findings also suggest diverse opportunities for summer courses as a useful platform for international collaboration. These findings provide useful information as to the design and further improvement of international collaboration in similar engineering courses settings.

Introduction

Globalization demands engineering talents to live up to the challenges from industry upgrading and development (Jesiek, Borrego & Beddoes, 2010; Gereffi et al., 2008). Countries like United States and Germany have already taken concrete steps to restructure their engineering education systems in order to stay competitive in the global talent pool.

China, as the largest producer of engineering graduates in the world, has been encountering many challenges in the field of engineering education and undergoing a series of engineering education reforms. One of the major problems lies in the oversupply of unqualified engineers and the undersupply of high-quality engineers (Gereffi et al, 2008). Considering the challenges facing Chinese engineering education, the Chinese Ministry of Education (MoE) carried out the "Education and Training Programs of Excellent Engineers" (ETPEE) in 2010. The main objective is to produce a large number of innovative engineering talents with global competitiveness so as to better meet the demand of transformation from labor-intensive economy to knowledge-intensive economy (Lin, 2012).

In response to the ETPEE policy, many leading universities in China have actively carried out reforms in engineering education. A number of leading universities has begun to incorporate the international dimension into summer schools and summer

courses. For example, Renmin University invited professors from leading universities worldwide, conducting research with cross-cultural, cross-national and cross-disciplinary focuses (Hong, Xuan & Zhang, 2010; Song & Lu, 2008). In the past decade, around 37 leading universities have tried organizing different formats of summer programs (Liu, 2012). These programs usually adopt advanced methods, such as problem-based/project-based learning, focus on team work and student-faculty interactions, etc. In addition, the international dimension of summer programs are often exhibited in the participations of renowned faculty members from different countries or in the implementation of curriculum with a global element. However, students' learning experience from the programs/courses in China has so far rarely been assessed in an empirical manner. This report focuses on understanding students' learning experiences through the assessing different aspects of its summer courses in engineering programs.

In particular, this study highlights nineteen different engineering summer courses in a research-intensive university in China. To promote teaching and learning, all nineteen courses have all invited renowned scholars from outside of the university to conduct the teaching. Here, in this report, we will first provide a background of the organization and implementation of these summer courses. Moreover, by assessing student engagement in the classroom and the instructors' creation of a supportive learning environment, we aim to explore the opportunities and challenges that are related to the international collaboration related to summer courses.

Literature Review

As mentioned above, despite the emphasis on launching summer courses as a platform for educational innovation, it remains unknown regarding students' learning experiences through these summer courses in terms of the level of student engagement, the establishment of an effective learning environment and other possible opportunities and challenges related to these summer courses.

To establish a rich learning environment that features active participation, team interactions and feedback could improve students' understanding of engineering methods and problem-solving (Palou et al, 2012). The How People Learn (HPL) framework, proposed by Bransford, Brown and Cocking (1999), has demonstrated its usefulness in improving students' learning and giving timely feedback for teaching and learning (Birol et al, 2005; Linsenmeier et al, 2008; Cox & Harris, 2010). The HPL framework consists of four dimensions, namely, learner-centeredness, knowledge-centeredness, assessment-centeredness and community-centeredness. With the structure of said four dimensions, it allows the teacher or students to actively participate in educational activities and learn from each other to improve teaching practices and content (Cox & Cordray, 2008; Zhu, 2013).

The establishment of an engaging learning environment will allow students to actively

participate in classroom (Palou et al, 2012). The National Survey of Student Engagement (NSSE) is a tool that assesses students' engagement, learning experiences, and skill development. Multiple studies have suggested that faculty members using active and collaborative learning approaches, interacting with students frequently, and creating a supportive teaching and learning environment in the classroom had impact on higher levels of student engagement (Kuh, 2001; Pascarella, 2001; Umbach, 2005). Other findings also suggested that the more students were involved in the above-mentioned educational practices, the more would they develop their learning skills and personal development (Kuh, 2003; Lee, 2010). Therefore, student engagement serves as an important indicator for assessing teaching and learning.

Context of the Study

University H is a leading research-intensive university in China. The summer courses have been launched at the University H since 2012. In 2014, forty-one graduate-level courses were offered with 24 courses in engineering related disciplines. Among these 24 courses, 19 engineering courses have invited scholars from outside of the university to be guest professors. These international collaborative summer courses (ICSCs) have emerged to be a dynamic platform for diversifying students' learning experiences. Most of the courses would invite renowned professors from top universities around the world to conduct the teaching. As shown in Figure 1, fifty-five percent of professors came from the US, followed by the UK and Japan (14% respectively). ICSCs provide students with a short-term exposure to advanced teaching resources, innovative learning activities and an international learning environment. It is expected that students would gain intense international experiences through these summer courses.

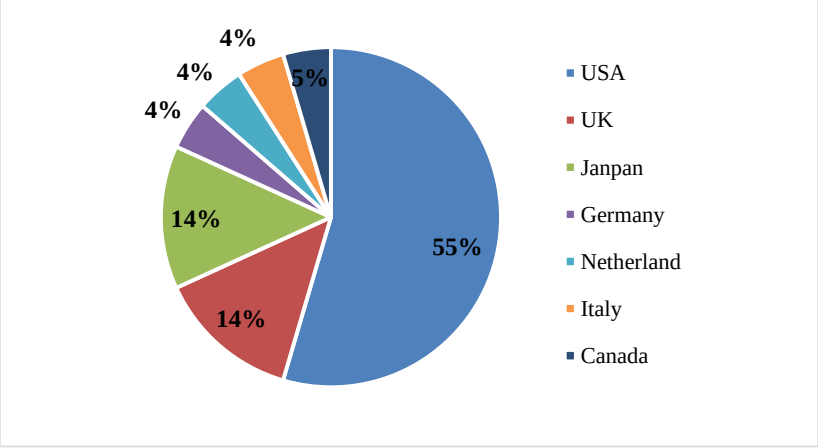

Figure 1 Distributions of guest professors' institutions

Method

Both quantitative and qualitative measures were conducted in this study to understand students' learning experiences in these courses. Specifically, a student engagement survey adapted from the NSSE instrument (NSSE website) was used to examine students' level of engagement. A survey designed in the context of the HPL framework (Bransford, Brown and Cocking, 1999; Zhu, 2013) was used to assess different aspects of the learning environment. Moreover, follow-up interviews were conducted to explore students' learning experiences in these courses.

NSSE is an instrument that provides prospective students with insights into how they might learn and develop at a college or university they are attending (NSSE website). The questionnaire collects information in this research mainly investigate student's level engagement based on five indicators, such as active and collaborative learning, enriching educational experiences, student-faculty interactions, level of courses challenge, and supportive teaching and learning environment (NSSE website). Twenty-six items were adapted from the NSSE survey.

A survey, which contains 26 items, was adapted from a validated HPL survey. The survey was distributed to students in the 19 ICSCs in summer 2014. In all, 225 complete responses were collected. Among 19 courses, 5 students from four courses agreed to be interviewed in a one-on-one manner.

Preliminary Results

The results from the student engagement survey implied active student engagement among these courses. As shown in Figure 2, more than 60% of students self-rated "often" or "very often" in the items related to listening carefully, working with classmates to complete assignments or projects, independent thinking. Only less than 5% of students suggested that they never participated in the aforementioned educational activities. However, student's level engagement was low in "make a class presentation" and "questioned teachers' points of view in class". More than 24% of students indicated that they never questioned teachers' points of view in class. Close to 21% of students suggested that they often come to class without completing reading or assignment.

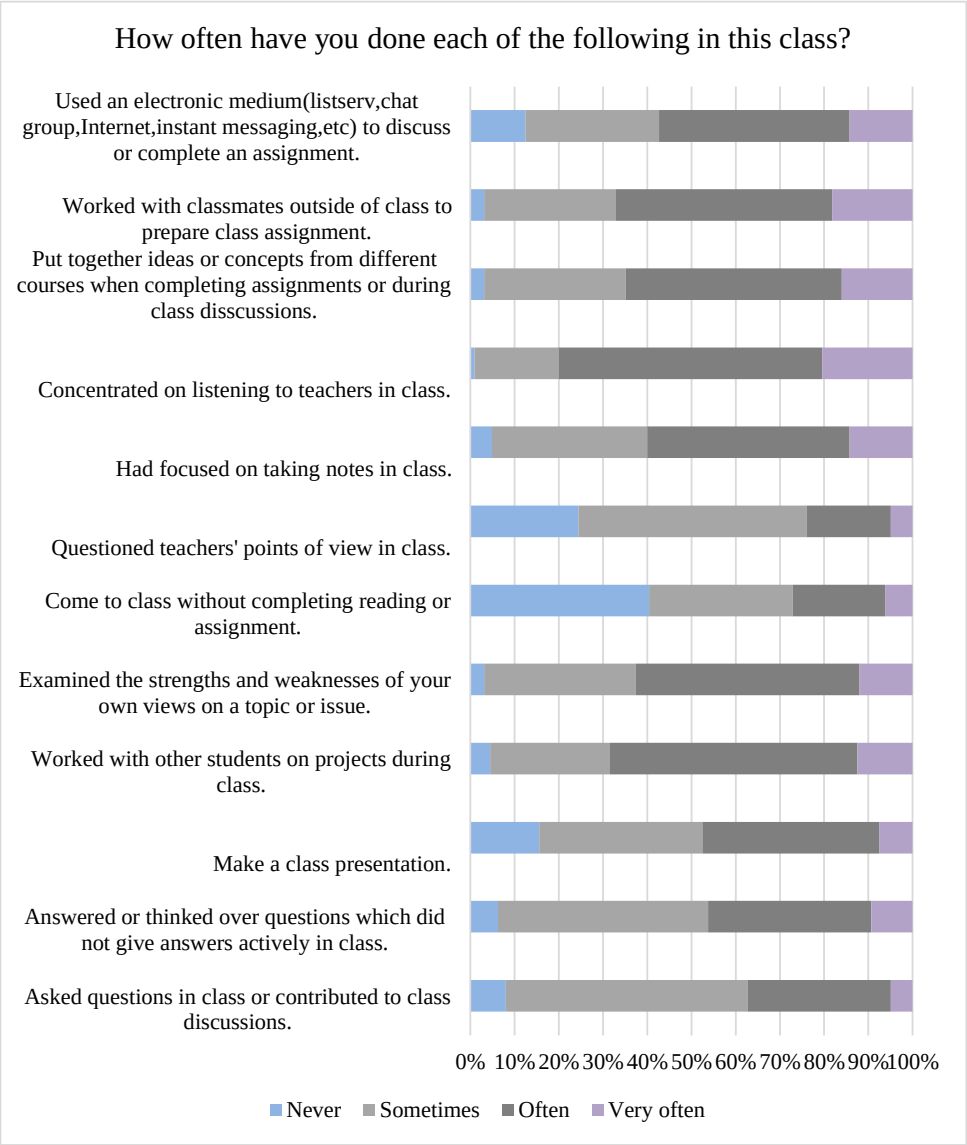

Figure 2 Students' level engagement

In addition, as shown in Figure 3, more than 70% of students self-reported "quite a bit" or "very much" in the items associated with analytical/critical thinking, problem-solving, etc. Only 7.56% of students indicated that instructors emphasized on memorizing course materials. The results suggested that much teaching has been devoted on developing students' advanced skills, such as analytical thinking, problem-solving skills, etc.

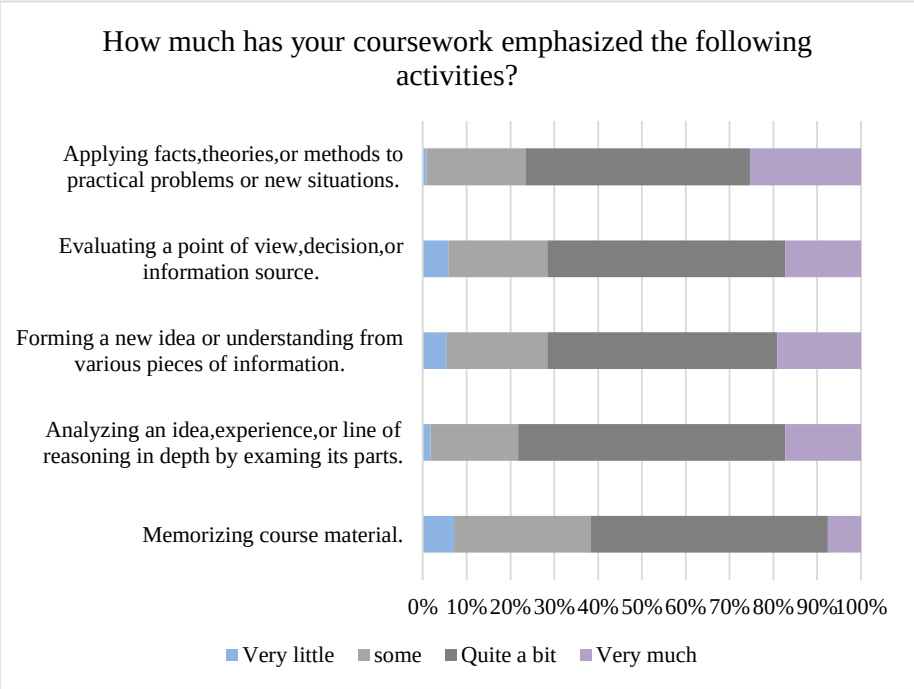

Figure 3 ICSCs educational activities evaluation

Accompanied with the high level engagement, it is found that students have made progress in hard skills and transferable skills, such as professional knowledge and skills, problem-solving, independent learning, team work, communication skills, etc. As shown in Figure 4, more than 60% of students self-reported that said skills have improved significantly. However, in areas like organizing and leading others, writing and speaking, students did not show as much improvement as the above-mentioned skills. More than 16% of students acknowledged that there was very little improvement in their organization and leadership skills.

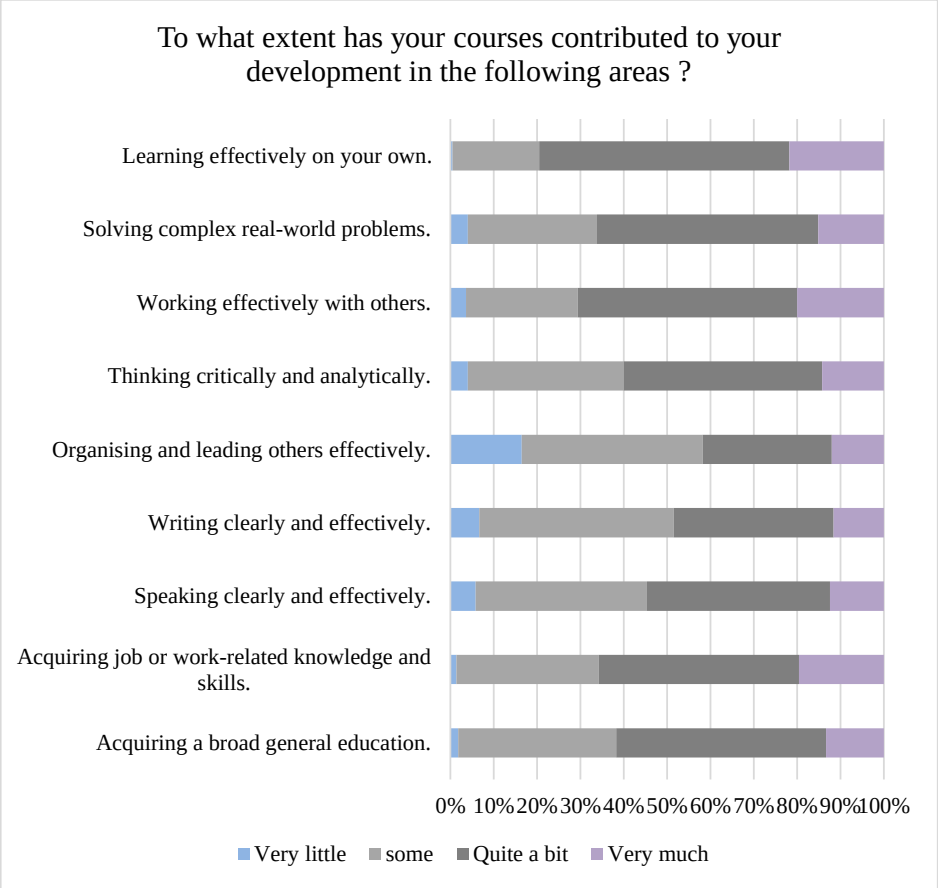

Figure 4 Learning outcome assessment

On the basis of the HPL survey, the learning environment in the ICSCs has reflected several dimensions of the HPL framework. As shown in Figure 5, instructors received high scores in the learner-centeredness, knowledge-centeredness, and community-centeredness items. Specifically, more than 56% of students chose “strongly agree” in knowledge-centeredness that scores were higher than another dimensions. Moreover, instructors received low scores in the assessment-centeredness items, 12.18% of students chose “strongly disagree” or “disagree”.

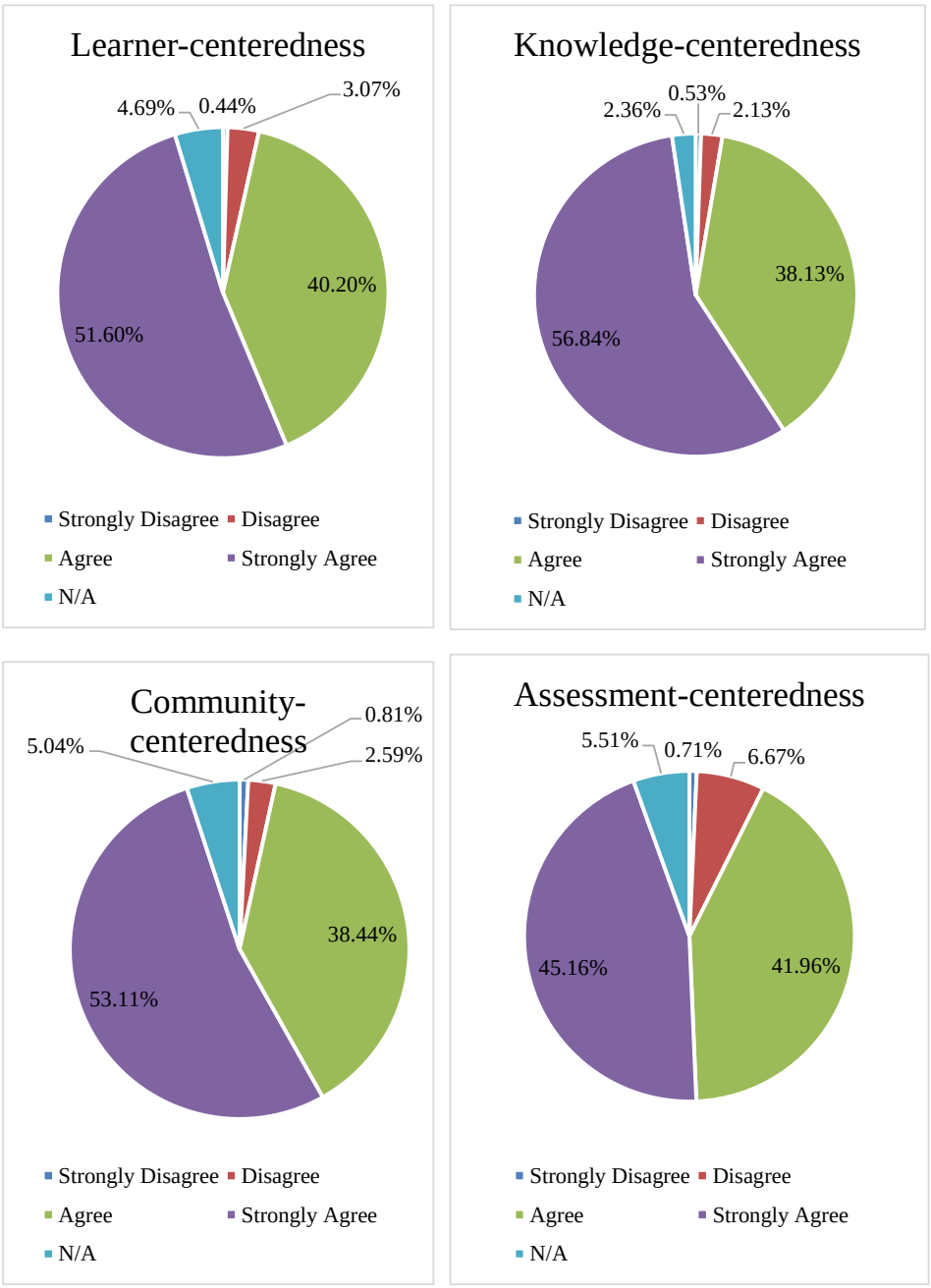

Figure 5 Learning environment assessment

Challenges and Opportunities in Students Learning Experiences

The quantitative results have suggested active student engagement and a collaborative learning environment. It also offered some insight into the potential opportunities and challenges as related with students learning experiences. In addition, we investigated the multiple challenges and opportunities related in students' learning experiences using qualitative interviews. These challenges and/or opportunities are discussed

below with student quotations.

Prompt student-faculty interactions

These summer courses are featured with prompt student-faculty interactions. Instructors emphasized the team cooperation and encouraged students to participate in the discussions. Professors paid close attention to students, noticed students' misunderstandings, and inspired students to independent thinking, which seemed to have also helped students' learning effectiveness as shown in the comment from our participant:

"In addition, instructors often communicate with students, ask questions, when we made mistakes or had problems, he would pointed out to us friendly, it's perfect."- Peter

Problem-based / Project-based teaching

What's more, students mentioned that the instructors usually gave numbers of illustrations to help them understanding the course materials in depth. Meanwhile, students said that the instructors also imparted learning methods to them. Some of them have said:

"He usually illustrated the lectures combined with numbers of cases or his research, it could make you feel these problems can be solved rather than not."- Peter

"The professor possessed a wealth of knowledge and experience in this field. When we could not understand the course materials, he would cite quite a few cases to illustrate these points to help us understand."- Yale

"They would concentrate on teaching learning methods besides the elementary knowledge. Instructors were focused on help students draw inferences about other cases from one instance."-Tracy

As mentioned above, instructors endorsed a "deep approach" (problem-based/project-based teaching, learning with understanding, sense-making) instead of a "surface approach" (memorizing disconnected facts and procedures) to students. This focus had allowed for students' analytical thinking and problem-solving.

Tight Schedule

In our interviews, students talked about they faced the pressure to absorb and integrate a lot of course materials in a short time:

"Compared with courses of regular terms, although lecturers of these summer

courses organized their contents more carefully, it requires great effort for student to take in large amount of information within short time constraint. ……"- Tracy

Discussion

In sum, our quantitative results indicate that the ICSCs were featured with advanced educational activities and an engaging learning environment to enrich students' learning experiences. Prior findings indicated that the more students were involved in above mentioned educational practices, the more would they develop their learning skills and personal development (Kuh, 2003; Lee, 2010). However, the quantitative results also suggested some potential challenges, such as students' improvement in their organization and leadership skills. Follow-up interviews with students showed that students' experiences with student-faculty interactions and teaching methods like problem-based/project-based teaching seemed to have helped their engagement in learning. Meanwhile, large amount of course materials presented within tight schedule presented a challenge to our students.

Considering prompt student-faculty interaction, researcher have pointed out frequent faculty-student interactions would have a profound effect on students' learning outcome, such as enriching their knowledge, improving independent thinking, and practical skills (Kuh, 2001; Pascarella, 2001; Umbach, 2005). Similarly, instructors in the ICSCs here focused on student-faculty interactions to enhance student engagement and inspire students' active learning and independent thinking. These efforts might have enriched students' learning experiences.

In addition, the ICSCs highlighted advanced teaching methods including problem-based or project-based teaching. Instructors focused on students' analytical thinking, problem-solving and practical skills. Prior findings indicated that global engineers could better meet grand social and technical challenges and were able to cope with the international standards when they possessed the above mentioned skills and abilities (Jonassen, 1997; Felder, 2000).

In sum, by establishing a supportive teaching and learning environment that incorporates advanced teaching approach, prompt student-faculty interaction, and renowned instructors, the ICSCs might have helped students gain international learning experiences.

Conclusions

This study has provided a background of the organization and implementation of these international collaborative engineering summer courses, assessed student engagement and the learning environment, and explored the opportunities and challenges that were related to the international collaboration related to summer courses. Our preliminary findings suggested that the summer courses were featured

with engaging educational activities and a collaborative learning environment to enhance students' level of engagement. These findings can provide useful information as to the design and future improvement of similar international collaborative engineering courses.

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