Using the Transnational Setting to Develop the Intercultural Communication Skills of Electronic and Electrical Engineering Students

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Abstract: The development of soft skills in engineering education is essential to complement hard skill knowledge acquisition to prepare graduates to work in an increasingly globalised labour market. This research is the result of collaboration between English for Academic Purposes (EAP) practitioners and electronic and electrical engineering (EEE) specialists involved in a transnational education (TNE) engineering partnership between a UK and Chinese Higher Education Institution. Both cohorts of students study the same modules, but typically there have been few links between the two schools. The aim of this research was to analyse difficulties in intercultural communication (IC) between the two cohorts working in mixed groups on a Collaborative Online International Learning (COIL) engineering task within the Transistors and Optoelectronics module. A case study approach was taken with the use of mixed methods: a questionnaire, observation, conversation analysis, and focus groups. The results of the case study have highlighted a need for increased IC across the TNE context with a large proportion of students (71%) stating they had no experience of communicating with other engineering students from different cultural backgrounds. Also, although language played a role in the difficulties students faced when communicating across cultures, it was not the most significant, with teamwork and technology issues the major barriers to successful IC. The results of the study have raised pedagogical implications for the teaching and learning of soft skills on the EEE programme with interventions to include developing teamwork across cultures, including the use of technology, and highlighting the responsibility for communication in an IC context.

Key Words: Engineering Communication, Intercultural Communication, Transnational Education, Soft Skills, English for Academic Purposes, Collaborative Online International Learning

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1. INTRODUCTION

The development of students' soft skills has become increasingly important to complement hard skill knowledge acquisition in engineering education. This need arises from an increased demand from engineering companies and accreditation bodies for graduates to be able to communicate in a more globalised interconnected labour market (Handforth, et al., 2017; Rico-Garcia and Burns, 2020; UK Royal Academy of Engineering, 2007; U.S. National Academy of Engineering, 2004; Yu, 2011). 'Soft Skills' definitions vary but encompass effective communication, teamwork, and problem solving (Deep et al., 2020). One such facet of the generic term effective communication

is intercultural communication (IC) which can be defined as 'communicating across different cultures' (Rico-Garcia and Burns, 2020, p. 834).

Engineers have been typically stereotyped as ineffective communicators (Ahearn, 2000). However, as the need to be effective communicators is becoming an increasingly important attribute of a successful engineering graduate, engineering programmes need to adapt to meet this need. Various approaches have been taken. Traditionally, study/work abroad programmes and language courses have been offered to students to help develop their IC (Yu, 2011). More recently, Collaborative Online International Learning (COIL) has been used as an experiential learning pedagogy to aid IC. COIL is a new teaching and learning approach that 'promotes the development of intercultural competence across shared multicultural learning environments' (Rubin, 2015, p.4).

Previous research has considered the effectiveness of COIL projects in various disciplines: a university IC programme in the USA and Russia (Minei et al., 2021); Dentistry students in South Africa and the USA (Vahed and Lavine, 2019; Vahed and Rodriguez, 2020); Nursing students in the USA and the Philippines (de Castro et al., 2018). Barriers to success were also investigated in Food Science students in South Africa and the Netherlands (Naicker et al., 2021). In Engineering, previous studies have considered the effectiveness of COIL projects: Engineering Management students in the USA and Ghana (Appiah-Kubi and Annan, 2020), and Mechanical and Industrial Design Engineering students in the UK and Venuzuela (Munoz-Escalona et al., 2022).

However, few studies have considered student difficulties in conducting COIL projects in engineering. Villar-Onrubia and Rajpal (2015) briefly discuss the experience of COIL between Civil Engineering students at Coventry University and South China University of Technology. Also, Gonzalez, et al., (2008) analysed IC student difficulties in Mechanical Engineering design teams between students from Tecnológico de Monterrey (ITESM) in México, Virginia Tech & Howard University in the USA, Darmstadt University in Germany, and Shanghai Jiao Tong University in China. Online educational technology has developed since this early study and consequently further research is required.

This initial study aims to continue this tradition by identifying students' difficulties working across complex cultural and national boundaries in a Transnational Education (TNE) Engineering programme through a COIL assessed seminar task. The results of the study will directly inform teaching and learning on the EEE programme and highlight areas for English for Specific Academic Purposes (ESAP) support to improve students' soft skills. Further research will focus on the benefits of the approach and the efficacy of planned interventions.

2. METHODOLOGY

This research uses a case study approach which is characterised by an in-depth study of phenomena in one setting (Denscombe, 2014). The following research question was investigated:

What are engineering students' difficulties when working across cultural and national boundaries?

The context of the case study was a Level 2, undergraduate EEE Module on Transistors and Optoelectronics. This module was divided into three sub-topics, all of which were assessed using

a seminar and a recorded presentation. The first two topics were run separately within each cohort, but the final topic, Global Solutions to Photovoltaic Power, had the additional element of international collaboration with both cohorts working and being assessed together.

To facilitate this joint working, the module leader blended the two cohorts together in one Microsoft team and divided the students into mixed cohort teams. There were three live seminars led by the UK and SWJTU module leaders, which were attended by both cohorts in a hybrid manner with students attending in person in their respective campuses and online through Microsoft Teams. In addition to these live sessions, the students were expected to communicate with each other and produce a joint video presentation as the final output. Both this communication and their participation in the video were assessed.

The case study consisted of four research instruments: a student questionnaire, observation of students working in seminar groups, conversation analysis in the Chat, and focus groups to describe their experience. The triangulation of the four research methods was used to increase the reliability of data analysis (Long, 2005; Serafini et al., 2015). The initial questionnaire was administered to 156 students in the first international seminar with a link to Microsoft Forms within the meeting chat. 100 students in total responded. The first questions identified the background of the students, in terms of where they were based and asked whether they had any prior experience of intercultural communication in engineering. Subsequent questions focused on how they had coped with this prior experience. These questions were based around previous results of student difficulties communicating across international boundaries. This included language, communication, teamwork, technology (Gonzales, et al., 2008; Villar-Onrubia and Rajpal, 2015), and any difficulties discussing engineering topics.

Although responsibility for the assessment of the module rested solely with the engineering faculty, the research was carried out through collaboration between engineering faculty, EAP lecturers and a student intern. For the observations, the student intern was physically present in three of the one-hour seminars in the UK and observed the online interaction from the Chinese cohort at the same time. Three seminar groups were observed using a naturalistic approach (Cohen, et al., 2018) with a narrative of what happened based on the issues identified above. This was coupled with analysis of the chat throughout the project between all the groups through Microsoft Teams. The observation and chat were coded under the same topics highlighted in the questionnaire: language, communication, teamwork, technology, and discussions about engineering.

The focus groups were held by the student intern at the end of the project, with volunteers being sought to discuss their experience of the COIL project. Two focus groups were held, one from the cohort in China with 4 students, and one from the UK with 5 students. Lasting for approximately 30 minutes, they were recorded on Microsoft Teams and transcribed. Semi structured questions used in the initial questionnaire and based around the same categories were asked in each focus group. Although two focus groups may not be enough to call 'saturation', the similarity of responses, homogeneity of the population, and semi structured questions suggest that group dynamics did not affect responses (Stewart and Shamdasani, 2014). The student intern as a researcher was important because as a student themselves, it was felt that the students would feel less intimidated and talk more freely. Also, as an outsider they were able to analyse the engineering

students' behaviour in a way a student from an engineering background might have found more difficult.

Institutional ethical approval was granted for this research and informed consent was obtained from all participants through a detailed participant information sheet. Students had the opportunity to opt out of the research. All responses were anonymised, and all data was held securely.

3. RESULTS

3.1 Experience of IC Communication

The results from the questionnaire showed that the two cohorts were not homogeneous but could be divided into 3 distinct categories: those based in Chengdu, those based in Leeds who identified as home' students or those based in Leeds who were classed as 'international' students. 71% of the total respondents stated they had no previous experience of communicating on engineering topics with other engineering students from different cultural and national backgrounds. This was the case for 93% of those based in China and 71% for the UK home students. In contrast, only 29% of the students who identified as 'international' but based in Leeds reported they had no experience of IC in engineering.

The following results are from analysis of the observations, Teams chat communication, and the focus groups:

3.1.1 Engineering Content

It appeared that there was very little discussion about engineering content within the groups. This could have been because, as suggested in the UK based focus group, *'all the students had all studied and learnt the same things'*. However, as one element of the question was to discuss the different global applications of photovoltaic power, there was scope for consideration of the differences between countries or regions, but most of the discussion was related to group dynamics and accomplishment of the task. However, students may have used different communication channels, perhaps within their respective cohorts to discuss the content.

3.1.2 Technology

The first seminar was hampered by the fact that during the live session students were in the same room in their respective campuses while communicating with the other cohort on Teams, so background noise and interference was high. These problems were solved when online attendance at the second seminar was made optional for the UK cohort and the Chinese cohort moved into separate rooms.

Few of the groups turned on the cameras and microphones and the main communication was through the chat function. However, when they did, it worked very well, as was observed in Seminar 1, Group A: *'There was a lot of engagement and free flowing conversations, hardly any silences, which is very different to the other two groups'*.

Both cohorts mentioned the use other platforms for communication, including WhatsApp, WeChat and QQ. However, it become a problem as they realised that they could not communicate between cohorts using these platforms, so they resorted to using the official means of communication,

namely Microsoft Teams. The UK based focus group noted both the advantages and disadvantages of Teams:

'[The] use of Teams was advantageous as everyone had access. However, the downside of this was that if there were disagreements people can just go in and edit [the presentation] what they want, so there was a lot of back and forth due to this.'

The Chinese cohort felt that the UK based students were reluctant to use Teams and used the functions of Teams differently, such as the channels, chat, and files. This resulted in the Chinese students' perception that they had to do more work. Also, the Chinese students reported that the UK based students lacked *'technical expertise'* in making videos which potentially highlights an area for support.

The time difference between the two cohorts made it difficult to communicate and arrange meetings, with the Chinese students complaining about the slow response of the UK based students to messages, which may in part have been related to the time difference. The UK based focus group realised towards the end that meetings could have been held earlier in the UK to accommodate the Chinese students:

'People in China were having the meetings at 9pm [2pm UK], maybe it would've been better for the students in England to come in earlier, as they [the Chinese students] were probably very tired'

3.1.3 Language

Language was reported as a problem on both sides, but it did not appear to be the main difficulty when communicating across cultures. Through the seminar observation and analysis of the chat no language issues were identified by the observers, perhaps because both teams were using relatively simple English or using the chat function rather than speaking.

In terms of perceived language problems, a *'language barrier'* was mentioned by one UK based student, who approached the module leader to ask for language support because sometimes he felt that he had more work because of there being a *'lack of understanding of what was being asked'*. However, other UK based students reported they had suggested ways of improving the language which had resulted in the Chinese students improving their work.

The students based in China mentioned that they felt the UK based students were *'speaking too fast'* and using a *'lot of short forms for words, whereas we used the full forms. [It] took a little getting used to'*. They also found that *'it was difficult to understand [UK based] students who had a strong accent that we weren't familiar with'*. Some reported that they had no problems as they relied on the chat function to communicate, so they could translate or think about their reply. Both sides overcame difficulties by seeking clarification from other members of their group.

Overall, language did not appear to be a problem that could not be overcome through the various coping strategies described.

3.1.4 Communication

Both cohorts identified problems with communication and working in a group which they perceived as originating in cultural differences. One problem which the UK focus group highlighted was the Chinese students did not state they did not understand, *'No one, ever said that they didn't understand, however, later it was seen that what was said wasn't understood'*. This could have been because they did not realise they did not understand or a reluctance to admit that they did not, perhaps due to a lack of confidence or a cultural reluctance to 'lose face'. An interesting comment from a Chinese UK based student was that he did not notice any communication issues *'as he understands the way [Chinese] students react and speak in English. He says that any issues arose because they don't react in a British way.'*

Some problems with communication were obvious from analysis of the chat and it seemed that often the conflict or irritation was due to a lack of shared understanding about who was responsible for communication:

'Try to understand it then.' (UK based student)
'You are not making this conversation efficient, I am here to solve problems and I can't figure out the problem if you just tell me to figure it out myself, I need more context to find the issue.' (Chinese based student)
'I explained everything you can read what I wrote again you may understand.' (UK based student)

3.1.5 Teamwork

A key problem with teamwork highlighted by both cohorts was uneven distribution of work. A contributory factor to this was that some teams were too large, which made it easier for people to 'hide' and not participate fully. It also seemed that inter-cohort teamwork could be as much of a problem as international teamwork with issues arising within groups but not necessarily across cohorts.

4. DISCUSSION & CONCLUSION

The study has highlighted a need for increased intercultural communication within the EEE School and particularly in the Joint School. The opportunities afforded by the transnational partnership in terms of intercultural communication could be exploited more fully. COIL can be used a pedagogy to aid this communication and offers an inclusive 'study abroad experience without leaving home' (Naicker et al, 2021, p.10), which may benefit both cohorts.

Language issues were not perceived by students to play a major role, but some issues were highlighted such as the speed of delivery, accent, use of abbreviations, and use of idiomatic phrases. Both cohorts of students used a variety of coping strategies to overcome any issues that arose such as the use of translation, and clarification from other students. However, all students need to be made aware that 'linguistic competence is not an indicator of intercultural competence' (Holmes and O'Neill, 2012, p.713) and that communication is a two-way process rather than 'a narrow one-way flow of EAP students needing to adapt to local norms' (Douglas and Rosvold, 2018, p.36). As Taguchi and Ishihara (2018) discuss, the pragmatics of interactions between speakers using English as a lingua franca (ELF) is complex. However, it is viewed as a joint action to reach a communicative goal rather than an individual action. Consequently, the responsibility

for communication does not lie with only one of the participants. Each of the interlocutors needs to try and understand and interpret behaviour as well as language, not just the non-native speaker or the one who is less competent in English.

The role of confidence cannot be ignored with the more confident students taking a lead and also more willing to ask questions to clarify issues. Naicker et al (2012) also discussed the lack of confidence felt by the South African students at the beginning of their study, which begin to develop throughout the COIL project. Bond (2020, p.153) states that 'given that lack of confidence is one of the issues identified by students as reducing their cultural capital, the importance of this role should not be dismissed.' Therefore, developing confidence can help to aid intercultural communication.

The lack of student difficulty discussing engineering content can perhaps highlight to students the 'small cultures' approach to intercultural communication rather than 'large' national cultures (Holliday, 1993) or an essentialist approach which is predominant in engineering education (Handforth et al., 2017). This emergent or constructivist view of culture implies there may be 'more in common between two engineers from different countries than between an engineer and someone in a very different profession from the same country, depending on the topic and context of the communication' (Maemura, 2017). This can be used to ask students to 'reflect on and to discuss the cultures of small groups and institutions that they belong to and try to better understand from where their own worldviews originate' to reduce stereotyping (Handforth et al., 2017, p.172). Developing intercultural communication includes acknowledging fear, building confidence, and questioning stereotypes.

Finally, one critical incident (Arthur, 2001) that arose could be used as a basis for future training. A Chinese based student did not participate in the view of their UK based teammates, so it was decided to leave their name off the presentation slides. When the student in China added their name, one of the UK based students launched a public personal attack on them in Microsoft Teams. It was interesting that both these students were Chinese but from a different cohort, again highlighting the problems with taking an essentialist view of IC.

To address these issues highlighted above it is planned to hold a series of interventions to begin to highlight potential barriers of IC and improve the student experience. This may include a session on the possible practical barriers to collaborative working with the students exploring potential solutions. For example, working in teams and use of technology. Another session could be held on issues that may arise through cultural differences and working in international teams.

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