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Inclusive Learning Environment in Transnational Education: A Case Study of a First Year Software Engineering Programme

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Abstract

This research explores the execution of an inclusive learning environment (ILE) in a first-year Software Engineering programme at a Chinese university within a Transnational Education (TNE) framework. The practical use of inclusive education in TNE settings is still relatively underexplored, despite its acknowledged role in improving student experiences and results. Using surveys, interviews, and module evaluations, the study examines the unique challenges and opportunities presented when inclusivity practices cross-cultural and educational borders. The research identifies three key factors in creating an ILE: the programme setup, cultural sensitivities in teaching, and diverse assessment methods. These factors significantly enhance student engagement and overall learning outcomes. The study notably contributes to the discourse on inclusivity in TNE, particularly within the Chinese context, offering practical insights for educators and stakeholders developing inclusive TNE software engineering programmes. It ends by recommending further research on the long-term effects of these strategies on student outcomes and TNE policymaking.

Keywords: *Inclusive Learning Environment; Transnational Education; Inclusive Curriculum Design; diverse assessment methods*

Introduction

In today's globally interconnected world, education has taken on an increasingly transnational dimension. Transnational education (TNE) refers to the mobility of education providers and programmes across national borders, rather than the movement of students. TNE has grown significantly in the last decade and is now a key aspect of the higher education landscape globally.

As the number of TNE programmes continues to rise, so too does the need for inclusivity within these programmes. Inclusive Learning Environments (ILE) aim to provide an equitable learning experience for all students, irrespective of their cultural, linguistic, or socioeconomic background (Yeo & Newton, 2021). An ILE is particularly important in the context of a TNE programme, where diverse groups of students engage in a shared learning experience across different cultural and geographical contexts (Henderson et al., 2017).

This need for inclusivity is critical in software engineering education, a discipline that is rapidly gaining prominence within the TNE landscape. Software engineering is a highly technical and

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rigorous discipline, requiring a specific and targeted pedagogical approach. This approach needs to accommodate the various learning styles, abilities, and backgrounds of students within the TNE setting (Fabricius et al., 2017).

This study, therefore, investigates the implementation of an ILE for a first-year software engineering module at a Chinese University. This research has been conducted to answer the following research questions.

- RQ1: What is an inclusive learning environment in the context of the TNE paradigm?
- RQ2: What are the key factors that contribute to creating an Inclusive Learning Environment in the context of TNE?
- RQ3: Explore the possibility of adopting existing frameworks for inclusive teaching and learning in the TNE context.

In this paper, Section 1 provides an introduction and research questions that the research aims the answer, Section 2 provides an overview of the state of the art in the problem domain, Section 3 introduces the case study employed in this research, Section 4 discusses the results and the findings of this research, Section 5 provides the discussion and Section 6 discusses the future research.

Background and literature Review

Global education landscape has witnessed significant transformations over the past few decades. Two prominent emerging themes are the emphasis on inclusive learning environments and the rise of transnational education, especially in disciplines like software engineering. This literature review delves into these themes, exploring their intricacies, interconnections, and implications for the future of higher education.

Transnational Education Overview

Transnational Education (TNE) refers to the provision of educational qualifications from institutions in one country to students in another. Transnational Education (TNE) has garnered significant attention in recent years due to the increasing internationalization of higher education. Over the years, TNE has evolved, driven by various socio-political, economic, and technological factors, making it a significant component of the global higher education landscape (Knight, 2015). As the landscape of TNE evolves, there is an increasing focus on ensuring an ILE for all students (Bannier, 2016). The construct of an 'inclusive learning environment' is multi-dimensional and includes aspects such as blended learning, cultural sensitivities in teaching, and diverse assessment methods.

Overview of Inclusive Learning Environment

The development of inclusive learning environments in Transnational Education (TNE) is complex and multifaceted, requiring a nuanced understanding of diverse cultural, linguistic, and educational backgrounds. Hofstede's cultural dimensions theory provides valuable insights into the impact of cultural differences on learning behaviours and preferences in TNE contexts (Hofstede, 2011).

For instance, educators can use Hofstede's dimensions, such as power distance and individualism versus collectivism, to tailor their teaching approaches to the cultural

expectations of their students. Intersectionality theory, as proposed by (Cho et al., 2013), offers a critical perspective on the multiple, overlapping identities students possess and how these identities intersect to influence their TNE educational experiences.

The Community of Inquiry (CoI) framework, introduced by (Arbaugh et al., 2008), is also pertinent, guiding the creation of supportive educational communities that encourage interaction, reflection, and collaboration across geographical and cultural divides. Applying the CoI framework can help educators structure their courses to support cognitive, social, and teaching presence in online and blended learning environments. These theoretical perspectives provide a comprehensive backdrop for understanding the challenges of inclusivity in TNE and serve as a guide for educators and policymakers in developing effective, culturally responsive educational strategies.

Inclusive learning environments prioritize the creation of settings where all learners, irrespective of their backgrounds, abilities, or needs, can thrive academically and personally. Such environments are rooted in the principles of equity, diversity, and accessibility, ensuring that every student feels valued and supported (Adams et al., 2016).

Inclusivity in education encompasses several key principles. Firstly, equity emphasizes that every student, irrespective of their background or ability, should have an equal chance at success in their educational pursuits (Smith et al., 2023). Secondly, diversity is about acknowledging, respecting, and valuing the vast differences among students, whether related to culture, gender, ability, socioeconomic status, or other factors. Lastly, accessibility ensures that all educational materials, resources, and teaching methodologies are available to everyone, particularly catering to those with disabilities or special needs (Clark & Mayer, 2011).

An inclusive learning environment is characterized by several essential components. Curriculum design should incorporate diverse perspectives and materials that resonate with the experiences of various groups (Banks, 2014). Pedagogical strategies should employ a variety of teaching methods tailored to different learning styles and needs. Assessment methods should utilize a broad spectrum of tools, enabling all students to showcase their understanding and skills. Additionally, support services, including counselling, tutoring, and supplementary learning assistance, are crucial in aiding students throughout their academic journey (Leijen et al., 2021).

Inclusive Learning Environment in Transnational Education

Inclusive education in the context of Transnational Education (TNE) refers to pedagogical practices and policies that ensure equitable access, participation, and success for all students, regardless of their cultural, linguistic, or socioeconomic backgrounds (Yeo & Newton, 2021). This concept has gained increased prominence due to the growing diversity in TNE programmes. Inclusive education is multi-faceted and involves several key components:

1. Accessibility: It's essential to ensure both physical (e.g., wheelchair ramps, elevators) and digital access (online platforms/resources) for all students. Providing accommodations and tools for students with disabilities is vital for their complete involvement in TNE programmes (Tomczyk et al., 2020).
2. Cultural Sensitivity: TNE programmes cater to students from various cultures. To foster inclusivity, educators and institutions must be culturally aware and consider the

diverse views and experiences of their students. TNE programmes often attract students from diverse cultural backgrounds (Roiha & Sommier, 2021). This means adding culturally pertinent content to the curriculum, encouraging intercultural dialogue, and recognizing and addressing any cultural biases in teaching.

3. Language Support: Language barriers can hinder students in TNE programmes. Offering services like English lessons or translation aids can level the playing field for students with varied linguistic backgrounds (McKinley et al., 2021). Providing multilingual support for academic and administrative procedures further boosts the inclusivity and accessibility of TNE programmes.
4. Student Engagement: In an ILE, active student engagement is crucial. This involves fostering a sense of belonging and community among students, encouraging student participation in discussions and group activities, and providing opportunities for students to contribute their unique perspectives and experiences (Owusu-Agyeman & Amoakohene, 2021). Engaging students in the learning process can enhance their motivation, satisfaction, and overall academic performance.
5. Assessment Diversity: Assessment Diversity: Traditional methods might not fully capture the abilities of all students in TNE programmes, especially those from varied backgrounds (Dai et al., 2019). Using diverse assessments like project tasks, group activities, and alternative evaluations can offer a more holistic measure of student learning. This caters to students' unique strengths and experiences.
6. Faculty Development and Training: Faculty Development and Training: For a successful ILE in TNE, faculty must be well-trained. Professional growth and training can improve their grasp of inclusive teaching, cultural understanding, and aiding diverse students. This continuous backing promotes a more inclusive learning atmosphere in TNE programmes (Nawaz, 2018).

Why does inclusivity matter in the context of TNE?

In the realm of TNE, inclusivity holds paramount significance as it addresses the diverse and global nature of educational settings. Inclusive practices not only promote equitable access to educational opportunities but also foster a sense of belonging among students from various cultural, linguistic, and socio-economic backgrounds. As emphasized by scholars such as Knight (2019) and Marginson (2020), TNE initiatives should prioritize inclusivity to ensure that educational experiences cater to the unique needs and perspectives of a diverse student body. This approach aligns with the principles of social justice and human rights in education, as advocated by UNESCO (2017). Inclusivity in TNE not only enhances the quality of education but also contributes to the development of a globalized and interconnected society, reflecting the evolving landscape of higher education (Wang, 2018). As TNE continues to expand, it is imperative to embrace inclusivity as an integral component, fostering an enriching educational environment for all participants.

Challenges in Developing an Inclusive Learning Environment in Transnational Education

Research on Inclusive Learning Environments (ILEs) has largely been grounded in home course contexts, shedding light on inclusive practices such as blended learning, culturally

sensitive teaching, and diverse assessment (Morgan & Houghton, 2011). However, this research primarily centres on domestic students within a single cultural context. In comparison, Transnational Education (TNE) which involves educational programs delivered across national borders has received less focus. TNE presents added layers of complexity due to the rich diversity in cultural, linguistic, and educational backgrounds of its students. These factors create both challenges and opportunities in striving for educational inclusivity. Cultural-Historical Activity Theory (CHAT) emphasises the cultural and social context of learning. In the context of TNE, understanding the diverse cultural backgrounds of students is crucial. This theory supports the idea that learning is a socially mediated process, and educators should consider the cultural and historical aspects that shape students' educational experiences (Batiibwe, 2019). Furthermore, the added layer of complexity enhances the application of potential methodologies such as the constructivism ('Teaching Instructivist Educated Digital Natives Using a Constructivist Learning Theory in Transnational Education', 2014) approaches due to the cultural gaps.

Inclusivity plays a pivotal role in enhancing software engineering education. Diverse software engineering teams, enriched by varied perspectives, often deliver more innovative and holistic solutions (Page, 2007). Moreover, the field of software engineering has historically been male-dominated, and inclusivity initiatives are crucial in addressing this gender disparity, ensuring that more women participate and excel in the domain (Cheryan et al., 2017). Additionally, given the global utilization of software products, an inclusive curriculum is essential in instilling cultural sensitivity among students, enabling them to create software that resonates with a worldwide audience (Misra & Fernandez-Sanz, 2011).

There is a dearth of detailed case studies on software engineering education in China, despite its pivotal role in the global TNE arena. Many existing studies present a general overview, often side-lining a deeper analysis of the strategies employed, their execution, and the associated challenges. Additionally, there's a pressing need for comparative research that juxtaposes software engineering education across varied TNE settings to glean a comprehensive understanding of best practices. General approaches such as Universal Design for Learning (UDL) (Al-Azawei et al., 2016) even have less effectiveness in the TNE setting. This warrants more serious investigation and effort to improve the effectiveness of such occurrences.

Additionally, while some studies have touched upon aspects like cultural teaching adaptations in TNE or online learning integration, there remains a significant gap in a comprehensive understanding of ILEs in this space. This study seeks to address this gap in the literature by exploring the implementation of an ILE for a first-year software engineering module in a TNE context at a Chinese university.

Case study

Introduction

This research employs an exploratory single case study approach to examine the implementation of inclusive strategies within a transnational software engineering program. As defined by (Hollweck, 2016), a case study allows deep analysis of a phenomenon in its real-world context. A TNE programme (BSc in Software Engineering for Business) delivered across China and the UK serves as the case under investigation. The cohort in discussion is

based in China whereas the teaching team has been based in the United Kingdom (UK). The cohort consisted of 80 students, who were divided into groups of 4-5 students in each for teaching and learning activities (TLA). This unit has employed an academic as a teaching assistant (providing direct support to students in the classroom) to support the TLA.

Data was gathered over a one semester cycle through one primary technique: Two student surveys - At the start and end of semester to assess comprehension, engagement, confidence levels using 5-point scale and open-ended questions (n=55). Convenience sampling was determined as the most fitting approach given the exploratory nature of this single case study. The sample comprised the entire population of second-year undergraduate students (n=80) enrolled in the selected UK TNE software engineering program at the partner Chinese university. Administering surveys to the full student cohort in this class allowed for gathering maximum variability in perspectives toward inclusive teaching strategies implemented within the module. Out of the 80 students, 55 fully completed both the start and end-of-semester surveys that served as the primary data source. Convenience sampling enabled access to this pre-formed group of students representing the case under investigation. Though limitations exist in generalizing findings from a convenience sample, for an under-examined phenomenon like inclusivity in TNE software engineering education, it granted valuable initial insights from the accessible population.

Unit Introduction, Intended Learning Outcomes (ILOs) and Assessment Strategy

This unit is mainly focusing on delivering the transferable skills which require for students learning computer science.

Intended Learning Outcomes (ILOs)

This unit has been designed to deliver the learning outcomes mentioned below.

- Foundations of information systems practice, methods, and tools. Relationships between people, organisations, information systems and information technology. Investigating, analysing, and modelling organisations, information systems and IT from different perspectives. Critical evaluation of modelling tools, business analysis and personal profiling tools.
- An introduction to the hybrid role of the information practitioner, identifying information needs of organisations and selecting appropriate technology to satisfy them. The importance of a socio-technical approach in understanding existing and potential information systems.
- Working with people. Forming and managing teams. Communicating, basic recordkeeping and documentation. Contemporary examples of projects in information systems. Practical communications skills.
- Practical communication skills. Report-writing, oral communications, interviewing, and giving presentations.

Assessment Strategy

Aligning with the ILOs of this unit, the assessments are designed as group-based assessments with the intention of proving more opportunities for the students to develop soft skills.

Assessment consists of two components, namely a portfolio exercise accompanied by a self-reflection and a presentation.

Teaching and Delivery

The educational delivery for this module was exclusively facilitated through online platforms due to the Covid restrictions in place at the time. A variant of the flip-classroom approach [14] has been adopted in the delivery of the unit. The student will physically attend two sessions of recorded lectures (40 mins each) followed by four sessions of live (Online) tutorials where they will work in their groups. During these live sessions, students are encouraged to engage collaboratively in group-based activities and discussions. It's pertinent to acknowledge the significant role played by the aforementioned teaching assistant in this module. Their contribution extends beyond conventional responsibilities, assisting not only the students but also the teaching staff. One of their notable roles has been ensuring efficient classroom management. Additionally, they have been instrumental in fostering effective communication between the teaching teams and the student cohort, ensuring a smooth flow of information, and addressing any potential concerns promptly.

Feedback Strategy

Formative feedback is provided to the students in groups during the live sessions. They also can receive feedback through electronic correspondence, specifically via email. They can also initiate a one-on-one meeting, should they express a desire for a more personalized feedback session. It's worth noting that the design of the formative feedback process is not merely reactive; it has been strategically planned to be dispensed upon the completion of specific assessment milestones. This approach ensures that students are provided with timely and relevant insights regarding their performance, enabling them to reflect upon and enhance their understanding and skills before proceeding to subsequent learning activities. This dual-channel feedback mechanism—both during live sessions and post-assessment—underscores the commitment to fostering an environment that prioritizes student learning and continuous improvement.

Student Feedback

Formal student feedback has been gathered via a questionnaire after the first week of teaching and continue to assess their learning and effectiveness of teaching via informal discussions and assessments of learning methods throughout the delivery of the unit. Again, the student's feedback was collected at the end of the unit to evaluate the effectiveness of the TLAs and for continuous improvement of the unit.

Execution of Unit and Unit Alignment

Exhaustion of the module has initially started according to the initial plan of the module delivery. The first week has provided an overview of the module and introducing the assessment strategy. The tutorials were dedicated to the groups and getting to know the members of the group. The second week has been dedicated to introducing the assessment and assessment-related topics.

After this, a formal student feed has been collected to measure the effectiveness of TLAs as part of the continuous alignment process to improve the quality of teaching.

Based on the student survey, the teaching team has realised the inefficiencies of TLAs with the current practice. With that, we have changed the method of delivery from the previously planned sessions to the new method of delivery illustrated in Table 1: Unit Delivery.

Table 1. Unit Delivery

Initial Pattern of Delivery	Altered Pattern of Delivery
Recorded Lecture 01	Recorded Lecture 01
Recorded Lecture 02	Recorded Lecture 02
Live Practical 01	Live revision
Live Practical 02	Live Practical 01
Live Practical 03	Live Practical 02
Live Practical 04	Live Practical 03

Furthermore, based on the student survey, the unit team has realised that the students are struggling with the language and the speed of delivery. The module team has deliberately slower the speed of speech during the recorded session as well as the live tutorial/practical sessions. Moreover, the teaching assistant has played a significant role in encouraging and helping students in understanding the concepts.

Result Findings

Data Analysis

Quantitative survey data was analysed using descriptive statistics. Frequencies, means, and standard deviations were calculated for survey responses on the 5-point Likert scale. This enabled summarising varying levels of lecture comprehension, tool understanding, confidence in skills, and other learning experience indicators across the student cohort. Further analysis involved comparing means from the initial and end-of-semester surveys to identify changes in averages.

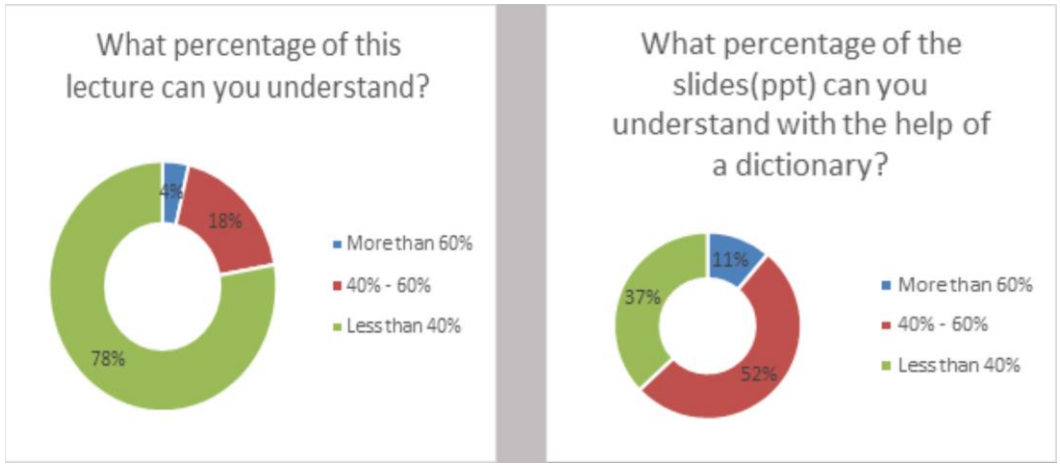
Qualitative data analysis was limited as many students faced difficulties articulating extensive feedback due to their still-developing English proficiency. However, a word cloud analysis was undertaken for open-ended survey comments. Broad themes identified reaffirmed language barriers and online delivery as two key challenges.

Analysis of Results

As part of the continuous strategy for increasing the effectiveness of teaching and improving the quality of delivery, we have conducted an early module feedback survey. This exercise of assessment for learning has given the academic team a ground-level realistic overview to place the academic expectations and alter the cause of delivery. Based on the predefined intention, we have used the below questions to assess the effectiveness of the delivery.

1. What percentage of this lecture can you understand?
2. What percentage of the slides(ppt) can you understand with the help of a dictionary?

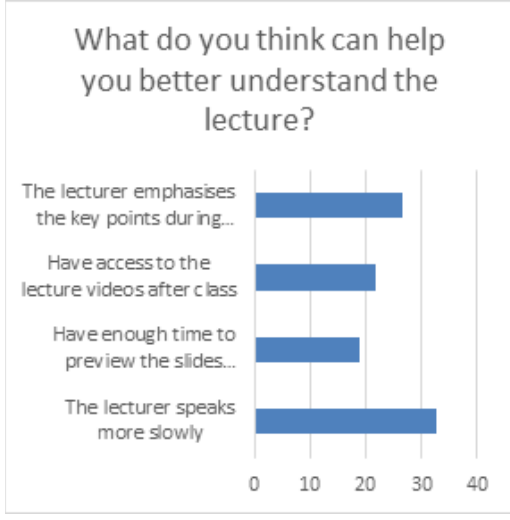
Figure 1. Assessment for Learning Survey Q1 & Q2



Furthermore, we have gathered students' suggestions to improve the effectiveness of the T&L activities through closed and open-ended questions.

3. What do you think can help you better understand the lecture?

Figure 2. Students' suggestions for improvement of delivery



Based on the open-ended question, we have identified two main themes.

Analysing the responses from the students the teaching team has realised the inefficiencies of the delivery. Specially 78% of the cohort understood less than 40% of the content being delivered and a further 52% of the cohort has been able to understand the content in the teaching material even with the support of a dictionary. This discovery, followed by suggestions and issues, suggested that there is a need for change in the module delivery and made the teaching team reconsider the approach to delivering this unit.

Table 2. Main themes of suggestions and issues

Theme	Issues / Suggestions
Language Literacy	• Speed of delivery (Speed of speech) • Summarising the key concepts and translation for their native language • Subtitles for online recordings
Mode of delivery	• Length of the sessions. • Issues with online delivery and preference for face-to-face delivery. • Gamification of T&L activities.

Based on the more open-ended questions, the teaching team has been able to identify two main themes which caused the inefficiencies in T&L activities: namely Language literacy & Mode of delivery. Online delivery in English (in a non-native language) has made a significant barrier to learning activities. The structure of delivery has further contributed to hindering the effectiveness of T&L.

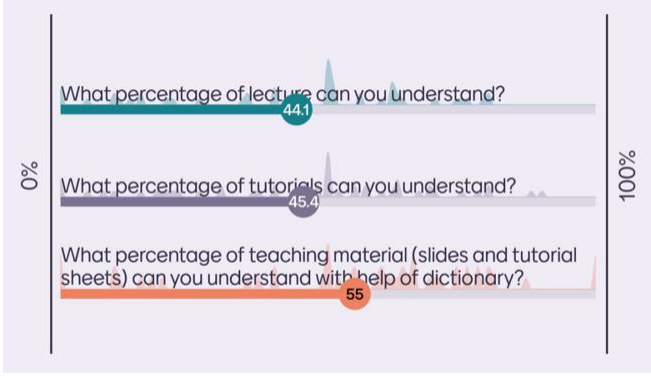
An end-of-module delivery feedback survey was also carried out online using Mentimeter. This survey was devised to assess the progress made through the semester in terms of students technical and soft skills as well as their confidence levels in progressing through their studies in an English-taught undergraduate programme. This survey consisted of the following 16 questions:

- Teaching Delivery
  - What percentage of lecture can you understand?
  - What percentage of tutorials can you understand?
  - What percentage of teaching material (slides and tutorial sheets) can you understand with help of dictionary?
- How much time outside of class have you spent studying for this module?
- What percentage of the learning materials that you have studied are in English?
- How many tasks do you have to complete in this coursework?
- How confident are you in
  - Business analysis
  - Requirements engineering
  - Business case
  - Academic writing
  - Reflection
  - Presentation
- What do you think can help you better understand the lecture?
- What other suggestions do you have?
- What types of learning materials have you used apart from ones provided in class?
- What suggestions do you have to help you study better on your own?
- Which task do you need to work on throughout the semester?
- Which task are consecutive task that need to be completed in order?
- How do you feel about giving a presentation as a group for 4-5 mins?
- If you are stuck what type of help and support is available to you?
- How do you submit the coursework at the end of the semester?
- What is the deadline of the coursework?

Responses from this survey relevant to the discussion in this paper are analysed below and compared with the responses from the start of module survey. A total of 55 students participated in the survey. Both numerical ratings and textual comments were collected from students. The following observations can be made:

- Understanding of Lecture: The distribution of ratings is somewhat spread out, suggesting varied understanding levels among the students. Some students reported a low level of understanding, while others reported a high level of understanding. This could be due to differences in students' backgrounds, familiarity with the subject matter, or learning styles.
- Understanding of Tutorials: The distribution is similar to that of the lecture understanding, with a spread of ratings suggesting varied levels of understanding. Again, this could be due to individual differences among the students.
- Understanding of Teaching Material: The distribution appears to be skewed towards higher ratings, suggesting that most students find the teaching materials (slides and tutorial sheets) helpful for understanding the content.

Figure 3. Assessment of the effectiveness of T&L



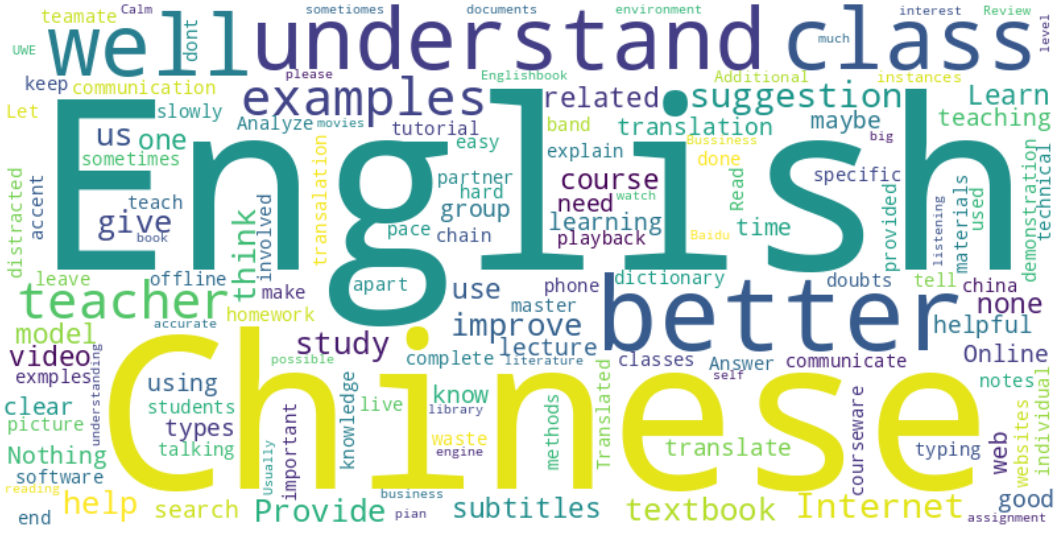
Regarding confidence in various skills, the following observations can be made from the students' responses.

Figure 4. Measuring the level of confidence as a tool of effectiveness

Students seem to be most confident in their Business Analysis skills, with an average rating slightly above 3 out of 5. This is followed closely by their confidence in crafting a Business

Case. On the other hand, Academic Writing emerges as an area where students feel least confident, with a significant number expressing lower confidence levels. Other areas like Requirements Engineering, Reflection, and Presentation see students' confidence levels averaging in the mid-2s. Overall, while there's a noticeable variation in confidence across different skills, there's also a clear spread within each skill, suggesting a diverse range of self-assessments among students.

Figure 5. Common themes among the cohort of students



From the word cloud analysis, we identified several themes in the students' feedback.

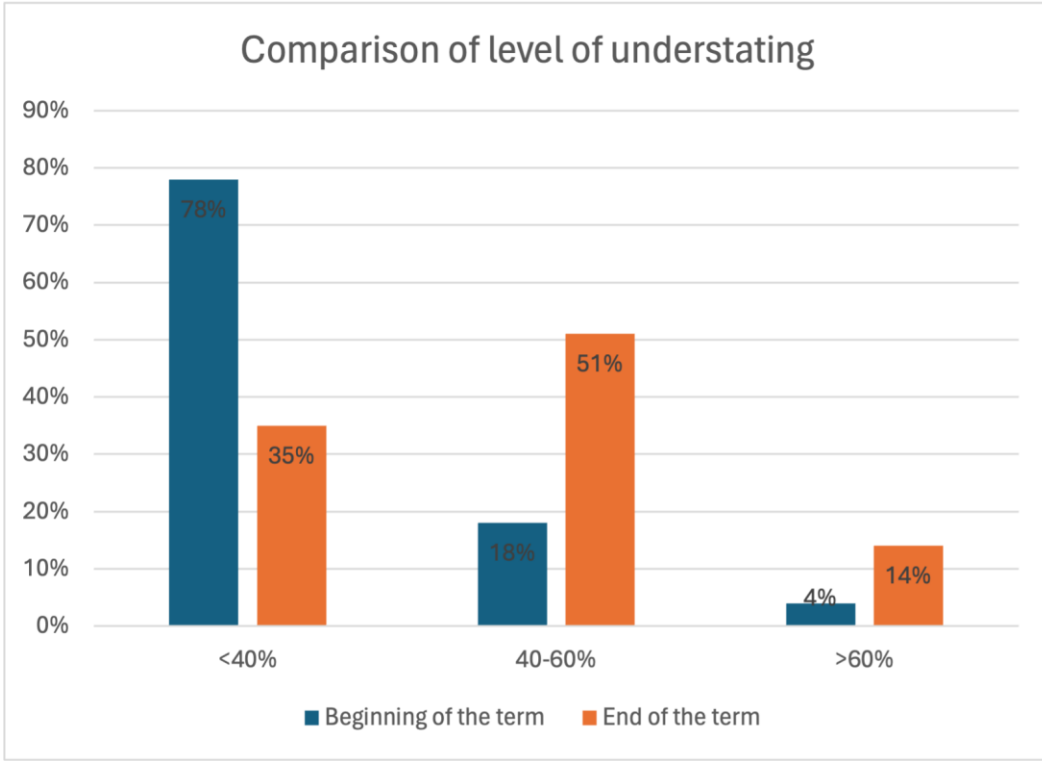
Terms such as "Chinese," "English," "better," and "understand" stand out prominently, underscoring the language challenges faced by the participants and their desire for clearer comprehension of the lecture content. The word cloud also highlights a mix of positive (e.g., "happy," "content"), negative (e.g., "unhappy," "dissatisfied"), and neutral terms. Many students mentioned the need for more examples and clearer explanations, as well as more time to understand the lecture content.

The analysis of feedback length showed that most feedback responses were relatively short. This could suggest that some students may not feel comfortable providing detailed feedback but also this might be due to students struggling to articulate their thoughts and experiences in English. Upon analysing the initial and final survey results, several critical insights emerge regarding the delivery and effectiveness.

Language Literacy

A preliminary observation from the first survey revealed that a substantial 78% of respondents grasped less than 40% of the lecture content. Additionally, 52% reported difficulties in comprehension even when resorting to dictionary support, indicating pronounced linguistic challenges. These challenges seem to stem from the rapidity of speech delivery, an absence of content translation into students' native tongues, and the unavailability of subtitles for online lecture recordings.

Figure 6. Comparison of the level of understating (teaching).



From the concluding module survey, variations in comprehension were evident among the participants, potentially attributable to individual disparities in linguistic proficiency and academic backgrounds. According to Sweller's (1988) findings, language barriers and unfamiliar concepts place undue strain on the limited working memory, impeding the learning process(Sweller, 1988). The initial survey data indicates that the majority of the cohort exhibited a lower comprehension level of the presented material. However, through language familiarisation and sustained efforts towards alignment, notable enhancements in understanding have been observed (Figure 6).

Figure 7. Overview of change in understanding of lecturers.

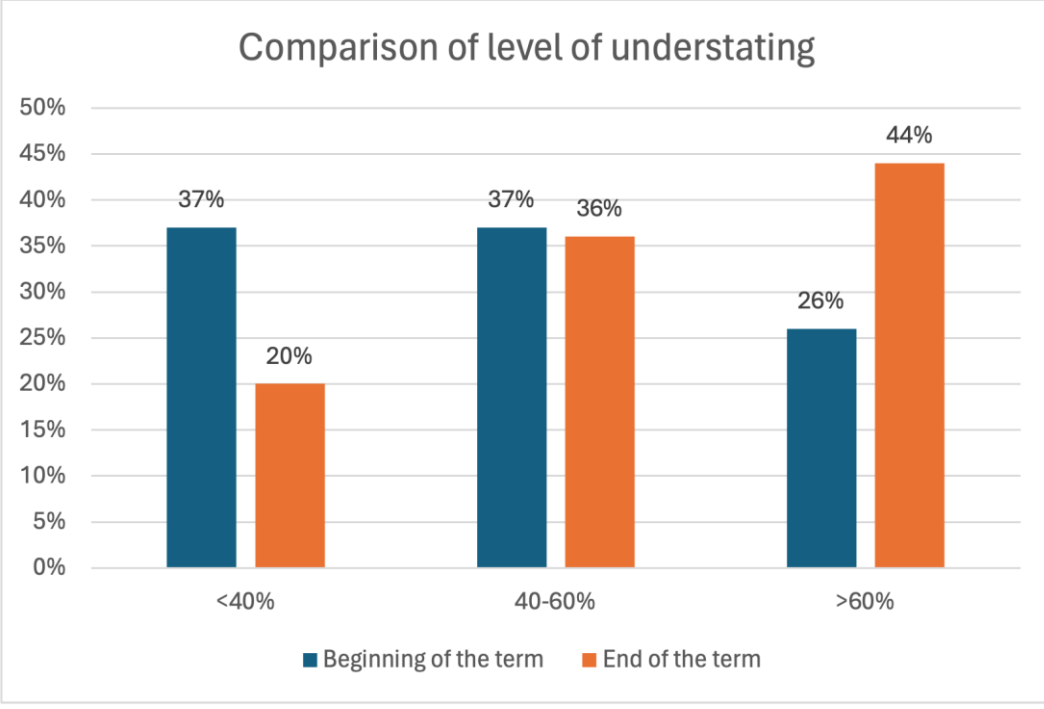
Understanding of the Lecture	Difference of Understanding
<40%	-43%
40-60%	33%
>60%	10%

A notable enhancement is evident across the entire cohort. The data suggests (Figure 7) that the measures implemented exerted a pronounced influence on students exhibiting markedly

low levels of comprehension. Moreover, this enhancement caused a ripple effect across other proficiency boundaries, thereby propelling their comprehension to the subsequent tier(s).

Furthermore, this study has analysed the different perspectives of linguistic (verbal vs. written) barriers faced by the students. Comprehension of written material also exhibits similar responses to the implemented changes during the term of teaching (Figure 8). One of the significant differences between the comprehension of teaching & teaching material significantly high proportion of students have been able to excel into the highest class of comprehension.

Figure 8. Comparison of the level of understating (learning material)



Overall, most of the cohort has exhibited improvement in comprehension over the course of the module, aligning with tenets around practice for retention (Figure 9). The scaffolding mechanisms and multimedia delivery methods implemented by the module team have had a favourable impact on heightening learners' grasp of concepts. The data intimates a pronounced spike in attainment of the highest thresholds of understanding. Upon comparing the trajectories related to lecture and material comprehension, notable discrepancies emerge. Learners demonstrated accelerated gains in retaining content delivered through supplementary materials (Figure 8, Figure 9). Potential catalysts underlying this pattern speak to myriad factors - persisting challenges with self-efficacy beliefs in verbal domains, variance in language fluency levels amongst academic staff, and ambient influences like technological facilities afforded.

Figure 9. Overview of change in understanding of learning material.

Understanding of the Lecture	Difference of Understanding
<40%	-17%
40-60%	-1%
>60%	18%

In conclusion, quantifiable improvements in overcoming baseline barriers have been achieved, but parity across diverse delivery mechanisms remains incomplete. Customised iterative pedagogical refinements can optimally aid uniform comprehension facilitation for this cohort.

Mode of Delivery

The mode of delivery was another prominent theme. The initial survey revealed dissatisfaction with the online format and the length of the sessions. Students also expressed a desire for gamification of teaching and learning activities.

However, the end-of-module survey does not directly evaluate the effectiveness of the changes in the mode of delivery but reflects upon the holistic view of the effect.

Confidence Levels

Another important dimension that emerges from the end-of-module survey is the students' confidence levels in various academic and technical skills. The results indicate a variance in confidence across different areas. Students showed the lowest confidence in academic writing, which could be a consequence of language barriers or a lack of previous experience with this form of communication. This may result in students struggling to articulate their thoughts and experiences.

Discussion

Considering these findings, there are several strategies that could be explored further in curriculum design and module delivery to foster an ILE for transnational education.

Scaffolded support for English language

Due to the varying linguistic backgrounds and English proficiency levels, students faced challenges in understanding and using academic English. Scaffolded support for English language learning can be instrumental in helping these students succeed. Providing structured support can help students learn. This support is gradually reduced as students become more capable and confident, allowing them to eventually perform tasks independently. In the context of English language learning, scaffolding could involve providing additional resources, personalized feedback, or one-on-one tutoring to help students improve their English skills.

In terms of implementation, scaffolded support could take many forms, including but not limited to:

a. Supplemental Materials: Providing supplemental materials such as glossaries, summaries, or translated versions of key texts can help students understand complex academic language.
b. Structured Activities: Structured activities such as guided readings, group discussions, or writing workshops can provide opportunities for students to practice and improve their English skills in a supportive environment.
c. Personalized Feedback: Providing personalized feedback on students' language use can help them identify areas for improvement and track their progress over time.
d. Language Support Services: Services such as one-on-one tutoring, language workshops, or online language learning resources can provide additional support for students who need it.

Feedback and Improvement

Regularly solicit feedback from students on what's working and what's not and use this feedback to continuously improve the course. An open dialogue about learning can make students feel heard and valued and can provide valuable insights for enhancing the inclusiveness and effectiveness of the course.

It's important to note that these insights are based on the data provided and may not be generalizable to all transnational online education contexts. Additionally, more detailed, and nuanced analysis would be possible with more data and more advanced text analysis techniques.

The transition from online to on-campus learning could lead to different findings in the following year:

Learning Environment

On-campus learning allows for face-to-face interaction, which can lead to more effective communication, better relationship-building, and a stronger sense of community. However, it might also present challenges for some students, such as those who have become accustomed to learning online or those who face barriers to on-campus learning (e.g., physical disabilities, transportation issues, etc.). It will be important to consider these factors and provide support to help all students make the transition smoothly.

Teaching Methods

Some teaching methods that are effective online might not translate as well to the on-campus environment, and vice versa. For example, online forums or chat groups might need to be replaced or supplemented with in-person discussions or group work.

Feedback

The transition to on-campus learning might result in different feedback from students. For example, students might have more comments on the physical learning environment, teaching styles, or peer interactions. It will be important to continue soliciting and responding to

student feedback to ensure that the course remains inclusive and effective in the on-campus setting.

Conclusion and future research

This case study explored the implementation of an ILE in a first-year software engineering program at a Chinese university. The case study focused on four components: curriculum design, student engagement, cultural sensitivity, and language support. The findings underscored the importance of these components in promoting inclusivity within the programme.

This exploratory study offers several tangible recommendations for educators and policymakers seeking to advance inclusive practices in transnational education contexts, particularly in software engineering programs.

At the institutional level, TNE providers should invest in robust professional development for faculty members centred on inclusive pedagogies. Topics should include scaffolded language support models, designing culturally responsive curricula, and implementing multifaceted assessments. Institutions should also develop comprehensive English language learning resources catering to diverse linguistic backgrounds.

TNE software engineering programmes need to actively foster student engagement and community-building to counter cultural alienation. Strategies could encompass peer-mentorship initiatives, intercultural project groups, and communication coaching for non-native speakers. Student feedback mechanisms must also capture inclusivity-specific concerns.

Further, accreditation policies for TNE programmes should integrate inclusivity metrics into quality assurance frameworks. This urges TNE providers to treat inclusivity as an integral component rather than an ancillary service. Specifically, policymakers can institute equitable access audits, benchmarking for representation in academic materials, and surveys to track belongingness perceptions over time.

Adopting these recommendations can significantly advance TNE programmes on the path to inclusive excellence. Specifically for software engineering discipline, this promises more diverse and innovative technical teams better equipped to build solutions for a global community. However, further confirmatory research across institutional types and country contexts would provide more tailored and nuanced guidance.

Future research should delve into the long-term impacts of an ILE on students' academic and professional outcomes. It would be valuable to investigate how the integration of diverse perspectives in the curriculum and the implementation of assessment diversity contribute to students' critical thinking, problem-solving abilities, and career readiness. Additionally, exploring the effectiveness of specific student engagement strategies in promoting inclusivity and enhancing learning outcomes would provide valuable insights for educators.

Further research is also needed to understand the cultural nuances and specific needs of students in different contexts. Investigating the effectiveness of cultural sensitivity initiatives in different educational settings would help tailor inclusive practices to meet the unique needs of diverse student populations. Additionally, exploring the experiences and perspectives of students with different linguistic backgrounds would contribute to the development of more effective language support services.

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