CASE STUDY

Facilitating collaborations between home and international students; different perspectives of engagement associated with having responsibilities in a group environment

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Abstract

This case study reports on students' responses to a newly designed group project used in a second-year undergraduate module at the University of Liverpool. The goals of the group project were to improve student engagement in the module and facilitate a collaboration between home and international students to develop a broader sense of student community within the department of mathematics. The extent to which these goals were achieved are explored in detail.

Keywords: student community, student engagement, belonging, internationalisation.

1. Introduction

Higher Education in the UK has been an attractive prospect for international students, particular from China, for a number of years. In the UK sector, the most popular route to transnational education is by far joint 2+2 programmes with established overseas partnership universities. These programmes allow international students to complete two-years in their home country followed by two-years overseas, in the overseas country of their choice, where they will receive their bachelor's degree. The 2+2 programme structure creates challenges at UK institutions, such as the potential for a disconnected student community due to the lack of previous interactions among new arrivals and current students, their different academic backgrounds, and low confidence especially with language ability in a new environment. This is also an opportunity for culturally rich collaborations whereby students from varying backgrounds work together to solve mathematical problems requiring not only technical skills, but also professional skills which are highly sought after by employers. The role of module leaders, acting as a facilitator for engagement, is of paramount importance for the bringing together of the wider student community within mathematics. It is well-established that having a strong sense of student community is associated to students' academic success (Johnson et al., 2023). A student community encompasses various elements such as belongingness, connectedness, and engagement (Rovai, 2002). In 2022-23, the authors led a second-year financial mathematics module, optional on the G100 (BSc Mathematics) programme, which had 150-students. This comprised of half progressing from Year 1 and half who newly joined the University of Liverpool in Year 2 as part of a joint programme with the overseas Chinese partnership university XJTLU. Even though the University of Liverpool - XJTLU partnership was formed in 2006, this was the first year in which a group project was used in the UK to connect home and overseas students. Naturally, many of the students in each of these groups, with very different educational experiences, will have established social groups in the previous year. Without extra-curricular activities, a lack of opportunity for collaboration between home and international students within the mathematics curriculum may elicit a lack of a sense of belongingness in their community. Both groups of students have informally spoken about the disconnected nature of the cohort. The authors introduced the newly developed group project for the purpose of addressing this inherent issue.

2. Assessment design, support, and evaluation methodology

2.1 The group project assessment design

The group environment is an opportunity for students to pool experience and expertise to solve the group tasks in a more effective manner than a collection of individual contributions. After studying core modules in Year 1, home students will be on different pathway, affecting which modules they study later, varying from statistics and probability, financial mathematics, pure mathematics, and applied mathematics. XJTLU students will have studied similar modules but have a different learning experience with different educational priorities. Several academic themes were incorporated into the group project assessment design to justify the group nature of the activity.

Incorporating IT skills

One of the roles of a Financial Analyst is to value financial products which are sold by institutions in the financial services sectors; a simple example being insurance packages. Often, valuing financial products are complex so simulations requiring mathematical software are used; MATLAB is seen as the most appropriate in financial mathematics. Digital fluency is at the heart of the University of Liverpool Curriculum Framework. MATLAB and Maple are fully embedded into core Year 1 mathematics modules, in addition R training is provided to all students on the statistics and probability pathway. On the other hand, many of the XJTLU students haven't encountered MATLAB or Maple but have encountered general purpose programming languages such as Java and C++. Overall, students' expertise using mathematical software are highly varied. For one of the tasks in the group project, students were given a model for the future daily movements of a stock S of a listed company which included a normally distributed random variable R, for the daily movement, reflecting the economic backdrop of their operations. The model was, $S(t+1) = S(t)\exp(R),\ t = 0,1,\dots,T$, where T is the number of trading days in one-year. Students were required to re-interpret yearly parameters to obtain a value for R and run predictions for the closing share price in one year using this model. These values were then applied to a financial product whose payoff L was dependent on S. Similarly, in a different independent task, students were required to import and analyse real daily share prices for two listed companies. Once the data was stored in MATLAB, students were able to plot the daily prices, compute rolling daily rates of return and measure volitatility, investigate seasonal trends, and compute other measures of risk on return studied in the course content.

Financial mathematics – connecting content to real-life

Given the vast technical language used, students find it difficult to interpret the features of financial products. By writing an assessment task for valuing a financial product from the perspective of a fictional employer, students were presented with a different way of thinking about risk, reward, and market valuation. This new context allowed students to further explore advanced content which are used in the financial sector. A second financial product was introduced whose value is related to the original financial product via a fundamental price parity theorem in this discipline; it was up to the groups to identify relevant results from lectures. To add depth to this problem one of the essential parameters, the financial return of a notional zero-risk investment asset, was removed. This allowed students to investigate how this is interpreted in real-life, i.e., government bonds are viewed as risk-free in this topic, and present their conclusions in a formal setting.

Statistical skills – using a wide range of analytical tools

Given N predictions of the share price discussed above, students were able to take these values and calculate an average price of a complex financial product set out in the assessment. These values, however, come with a degree of uncertainty due to the sampling within the simulation. Those from a

statistics background will be well-versed in, say, confidence intervals which would add depth to their analysis. Similarly, when presented with investment decisions, the coefficient of variation translates to risk-per-unit-of-return and useful for justification when making decision in portfolio management.

Research skills – research connected tasks

The parameters for R in the financial model discussed above are presented with little context. In the field of financial mathematics, one of the market models for predicting the return of an investment asset is based on an argument related to systematic and non-systematic risk, with a collection of strong assumptions. In the group project, students were required to select two listed companies, one from the UK market the other overseas, and identify and compare different types of risk from their review of the financial statements: a task with a hidden agenda of encouraging discussion between home and international students. As well as understanding these risks, students were required to present them in concise language in the report aimed at a general audience. This task had the benefit of allowing students to analyse financial institutions they find interesting and the environment in which they operate. Later, students may apply to graduate programmes for these companies hence benefit from their investigation.

2.2 Structured support

Several steps were taken by the teaching staff, authors of this case study, to support students through the potential challenges of working in a group environment; these are discussed further in this subsection.

Encouraging participation

There are different approaches of group formation discussed in the literature. Mahenthiran et al. (2000) investigated whether the performance and attitudes of students could be improved by either choosing the group randomly or combining paired friends. They observed that both student satisfaction and academic performance were significantly enhanced when students were allowed to choose a single friend in the group. This finding emphasises the importance of group formation when introducing group work. In the context of the group project, groups of size six with a combination of both home and international students in a single group was implemented. This was a modified approach to group formation, which was originally conceptualised by Mahenthiran et al. Students were given the chance to form subgroups containing three members which, in all cases, were based on social groups with common nationalities. These were then combined by the Module Coordinators into groups of six, split equally based on home and international students. This approach to group formation is based on Bradshaw (2009). Groups were formed one week before the start of the assessment activity and given organisational tasks to allow them to introduce themselves to each other before the assessment activity as well as become familiar with the online environment. One of the draw backs in this group allocation was it had little influence relating to group dynamics, e.g., ensuring leaders and other relevant characteristics are present. Every group was required to appoint a group leader and while each group was successful in identifying a leader, it is important to acknowledge the potential for a lack of willingness among group members to assume this leadership role. In order to mitigate this issue, one may wish to implement a mechanism that ensures the presence of leadership and other relevant characteristics within each group. In this context, the study conducted by Rowlett (2013) offers some valuable insights.

Supporting general communication

To support general communication within groups, private channels were set-up on Microsoft Teams allowing students to conveniently connect via message and video call as well as share documents.

Each group was required to appoint a Group Leader to ensure the group remained on task and to report any issues outside of their control, e.g., report weekly absences to the Module Coordinator.

Assisting with direction

Groups were required to hold at least one group meeting every week with all members present. As part of these meetings groups were required to agree upon plans to divide-up tasks, establish subgroups based on preferences, strengths, and experience, agree provisional deadlines to tasks etc. A requirement of the group project was for students to submit the minutes of their weekly meetings.

Promoting engagement

Employer themed projects whereby students are required to address their findings to a mock employer in a mock secondment scenario are an effective means to promote engagement and raise confidence (see Fairfax, 2023). For many students, this will be their first encounter with leadership and group accountability as part of their studies.

Recognising unequal contributions:

As recently highlighted by Shaw (2022), one common gripe with group work is the perceived lack of fairness when group members do not contribute equally. For simplicity, a group can receive one collective grade and each member receives the same grade. This is often fitting since, in most cases, every group member contributes similarly to the project's outcome. Yet, there are rare instances where one person might not contribute as much as the others. To address this issue, which could lead to wider dissatisfaction, clear instructions indicating individual and group responsibilities were written and regularly sign-posted during the assessment activity. At the conclusion of the group project, each student was required to complete a peer moderation task. A popular mechanism of peer moderation was identified in the project EPCoS based on practice at the University of Exeter (Milne, 1998). This approach was followed in the group project but conducted digitally. Each student had to complete a 'Buddy Check' (licenced software that can be integrated with learning management system) appraisal questionnaire, ranking the contributions of each group member as part of the peer moderation. This method helped the Module Coordinators pinpoint those who have either contributed less or more than intended by the group. Any deviations from the group average were reconciled with weekly group meeting notes and individual marks were adjusted according to contributions. The goal isn't to make detailed distinctions among group members but to acknowledge notably high or low contributions, e.g., when group work doesn't go according to plan because of non-participation, by adjusting individual marks. A similar method for adjusting the marks following peer moderation is discussed by Ian (1999).

2.3 Method for evaluation

A modern model of student engagement presented by Borup et al. (2020) sets out three indicators of engagement: affective (or emotional), behavioural and cognitive engagement. Emotional engagement is associated with emotional involvement in learning such as enjoyment, confidence and satisfaction or at the opposite end, boredom, frustration and dissatisfaction. Whereas behavioural engagement involves physically completing tasks associated with learning with, say, attending and participating in activities viewed as low and high levels of engagement respectively. In this study, several potential barriers were identified by the authors and students were asked to reflect on:

- belongingness at university,
- language confidence,
- satisfaction with their studies,
- their perceived academic readiness relative to their international peers, and

- whether academic ability was a factor in communication.

Cognitive engagement involves productive involvement with learning activities and viewed as the higher level of engagement associated with questioning and exploring concepts. The authors identified the following key areas for investigation: effort put into studies, self-regulation of study, direction with study, and perceived levels of engagement with studies. At the conclusion of the project, all students were invited to complete a questionnaire associated with engagement which are discussed in detail in section 3.

3. Students' responses and discussion

3.1 Goal 1: Facilitate collaboration between home and international students

There will be range of different emotions when a group project is introduced to students from diverse cultural backgrounds. Some students will want to connect with their international peers, but not have the confidence or feel that they have had an opportunity to make an approach to linking up. Other students may be less open to collaborating due to awkwardness or shyness, say, potentially due to feeling unprepared because of language confidence or perceived academic ability, hence prefer individual assignments and the comfort of their social groups. In this group project, only 3 out of the 25 groups appointed a Project Leader who was an international student highlighting the challenges associated with confidence among these students. In terms of backgrounds, the home students have encountered numerous group projects at the University of Liverpool within their first year of study, on the other hand, international students have been exclusively assessed using time constrained examinations (with some lower stakes in-semester continuous assessment) at XJTLU in their home country presenting challenges with group dynamic. It is important to also recognise different priorities within the student community. For example, compare students: (a) who are preparing for a career in finance or similar, with an international corporation in mind, who seek opportunities to work on a real-life project with new people; and (b) who intend to go onto postgraduate studies who will be looking to take on individual research projects and maximise their overall module mark to improve their applications. Those in the latter category may feel group work, particularly with less motivated group members, is unfair and prefer closed-book examinations. On the other hand, students from the former category will likely prefer the group set-up because they see its value, for example to demonstrate professional skills, as they seek to break into the graduate job market. Regardless, an ability to work with peers and communicate mathematics, orally or as a part of formal report writing, are essential skills for all students. The group project was designed in a way to allow students to establish their own workflows, creating personal accountability and requiring active involvement for all members. In reality, based on open responses about their positive experiences during the project as well as viewing subgroup formations, collaboration fell into two categories.

Category 1: Active collaboration with international peers involving problem solving, the widening of social groups and raising cultural awareness.

At the planning stages, a total of 10 out of the 25 groups, or 40% of students, discussed their academic experience prior to the project, identifying their strengths, weaknesses, and areas they wish to develop, and accordingly established sub-groups that best utilised the overall group's expertise. This contrasted with the remaining students who, on face-value, divided tasks by social groups, i.e., their nationalities, where communication skills and language ability were barriers. Those groups who actively collaborated with international peers wrote about their useful experiences in the open response section.

> *"Although awkward at first studying and problem solving with foreign peers was an eye opener and I believe ultimately useful in the long run, odds on at some point in my future professional career I will have to work along side someone who's first language is not english, or even I'm*

in a foreign country where I am the minority. Hopefully even this small taster of that will aid me in the future."

"Good to communicate and work together with international students, gained experience which we can talk about in the future"

"It was interesting working with people who have clearly been taught different previously, some of their knowledge was amazing."

"Collaboration and the availability of different minds when facing challenges"

"It was fun to meet and get to know more international students and work with them on the project."

These comments highlight the value attributed to facilitating collaborations between home and international students. These students were open to the challenges and persisted showing adaptability during tough times. There is evidence of peer learning on an academic level accompanying the professional skills development in terms of international awareness, as well as student satisfaction.

Category 2: Passive collaboration with international peers and raising cultural awareness

A total of 15 out of the 25 groups, or 60% of students, decided from the outset that they would work in subgroups which were based on their nationalities rather than, it seems, to work to their academic strengths. Many of these groups explicitly mentioned in their meetings notes that language was a challenge with group communication. These groups attempted to address these challenges with native speakers adjusting the pace of their speech and non-native speakers seeking clarification where there were misunderstandings; unfortunately, this did not transpire into active problem solving between international peers. Students' comments about language as a barrier are discussed in section 3.2. Even though these subgroups were formed based on their nationalities, at the weekly team meetings all students were required to come together and discuss their progress. There is some evidence of wider home-international student collaboration at this stage, for example, one student wrote:

"Personally I was assisted and assisted one of the Chinese students so we interacted a fair but, however I am not sure the same can be said for the rest of the group."

This situation demonstrates individual willingness for wider collaboration. To address the passive collaboration issue between home and international students in future years, teaching coordinators have identified student volunteers to share their experience of the project who will provide written advice for future students based on their own experiences in the current year. One way for the facilitators to encourage the whole group to think more careful about their individual skills when establishing sub-groups is to consider the number of independent tasks in the group project. By having a project which naturally splits into two independent parts has translated into this 2 : 3 active-passive collaborative split. It remains to be seen in future years whether having, say, three independent tasks within the project, with a strong student voice from the previous year, will coax more students into the active category.

3.2 Goal 2: To improve engagement particularly between home and overseas students

In section 2.1, five perceived categories influencing students' emotional and behavioural engagement were set out. Similarly, for the sub-components of cognitive engagement. As part of the evaluation, students were asked to reflect upon changes within each of these categories after the group project had run and before receiving their grades and feedback; a detailed analytical review will follow at a

later date. In the open response section, students were invited to write about any positive experiences; these are explored in the remainder of this case study.

Emotional and behavioural engagement

Generally speaking, students who feel disconnected from the student community are less likely to be engaged with their studies and hence less likely to play a meaningful role in group work. Students' sense of belonging at an institution shouldn't be taken for granted. Prior to the group project, both home and international students expressed feelings of disconnectedness; this being a major barrier for student engagement on an emotional level. When asked to comment on positive experiences from the project, two responses related to belonging.

> *"Meeting students i wouldn't necessarily have spoken to before."*
>
> *"It was fun to meet and get to know more international students and work with them on the project."*

Even though the group project had influence in this direction, there is more to be done to revive the wider sense of student community in the post lockdown period, for example, through student societies at the university level.

Language ability will naturally be a challenge for all non-native English speakers and this group project was no exception. Overseas students find themselves in a dominant English-speaking environment and may refrain from discussions due to being misunderstood or not being able to keep up with native speakers. Secondly, native speakers need to be aware of varying language abilities, otherwise they may be less willing to discuss tasks if they feel group members don't understand them. Several groups specifically mentioned language as a barrier to collaboration in their weekly meeting notes which goes some way towards accounting for the lower than expected active-passive collaborative split discussed in section 3.1. The group environment was an opportunity for all international students to put their language skills to use as well as a self-realisation exercise to discover any shortcomings in their abilities. For home students, it was also an opportunity to encounter group dynamic whilst working in diverse teams. Several comments were made in the questionnaire on this theme.

> *"Learning to communicate with international students, especially realising our grammar and word choices are different."*
>
> *"I have learnt what it is like for international students studying at this university in a new country and the language challenges they must face."*
>
> *"Working with international peers, I have a better understanding of their speech and habits."*
>
> *"Shows us how the international students experience university and the way they tackled the group project."*
>
> *"Having to deal with and overcome language barriers."*

Unsurprisingly, the low level of language confidence was skewed by non-native English speakers. Practice makes perfect and more opportunities to put language skills, and other broader communication skills, to the test facilitates this practice. The above comments suggest the group project has set an important foundation for bringing the wider student community together in this context.

Cognitive engagement

The project required students to use and develop diverse skill set and apply them appropriately in solving the open natured tasks. This includes but not limited to IT skills like programming, knowledge of financial mathematics and statistics, etc. As a result, students need to put in effort to not only understand their own areas of expertise, but also to grasp the basics of other areas to effectively engage when problem solving with their peers. Several comments were made in the questionnaire about positive experiences on these themes.

> *"Using Matlab to refresh my memory"*
>
> *"It is necessary to consider the problem from the other side's point of view"*
>
> *"As for the code, it is necessary to provide corresponding comments and explanations, rather than directly submit the finished part. It is necessary to consider the problem from the other side's point of view"*
>
> *"Collaboration and the availability of different minds when facing challenges"*
>
> *"Meeting new people. Working together"*

As discussed earlier this project was aimed to mimicking a real-life scenario. Consequently, this has allowed students to see real-life connections and hence provide direction as they progress with their studies. Several comments were made in the questionnaire on this theme.

> *"Applying coding to real world scenarios."*
>
> *"Specialisation of tasks allowing everyone to work to their strengths"*
>
> *"Having the group project relate to potentially an actual real world problem was very useful in terms of putting things into perspective of how approaching and completing a problem may work in the real world"*

4. Conclusion

This case study aims to demonstrate the potential of structured group work. The group project's design, emphasising real-world applications and the use of mathematical software were not only aimed to enhance the mathematical/technical proficiency of the students but also aimed to foster a sense of belonging and community; a major challenge given the nature of 2+2 programmes. As discussed above, the structured support provided by the teaching staff played a crucial role in facilitating effective communication and collaboration among students. The study revealed a range of emotional responses to this initiative. The feedback from students' post-project was interesting; a small number of groups openly expressed a newfound sense of belonging and appreciation for the diverse perspectives brought by their international peers. While some international students actively sought to connect with their home peers, others were hesitant, often due to language barriers or a lack of confidence in their academic abilities. Several of these students expressed regret not communicating with home students more as they prepare for English Language proficient tests required for postgraduate studies, but struggle to practice oral English. A small group of these students have agreed to provide advice for future students, from the experienced student voice, to help them overcome perceived barriers to engagement in future years. The insights gained from this study may be valuable to other educators and institutions seeking to create more inclusive and collaborative learning environments and both authors would welcome opportunities for their input.

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