LEEDS INSTITUTE *for* TEACHING EXCELLENCE

I-DE-ES Project

Diverse and Interdisciplinary Teams Sub-Project

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Project Report

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Introduction

This report has been created as part of the **L**eeds **I**nstitute for **T**eaching **E**xcellence (LITE) fellowship pedagogic research project into **I**nterdisciplinary and **D**igitally **E**nhanced learning and enhancing **E**mployability **S**kills (The I-DE-ES Project).

As the scope of the overall project is wide-ranging, activities have been broken down into a number of separate sub-projects, with reports and outputs created for each sub-project.

This report focuses on aspects of teaching and learning of diverse interdisciplinary teams during team-based activities and projects. The report extends beyond previous research by exploring some of the challenges and practical aspects of how diverse interdisciplinary teams of students work during team-based activities and projects, with a view to using this information to enhance future teaching and learning.

The objective of this sub-project is as follows:

- To provide practical and evidence-based recommendations for enhancing teaching and learning for diverse interdisciplinary teams during team-based activities and projects

Background

The Changing Workplace Graduate Workplace

Globalisation and introduction of new technologies such as artificial intelligence are changing the workplace. This is leading to major changes in the skill areas employers are looking for in their graduate hires. Increasingly, there is a demand for employees who are able to engage with and work in cross-functional teams to solve global issues including those related to sustainable development (Nunkoo, Sharma, Rana, Dwivedi & Sunnassee, 2021; Skills 4 Employability, 2020).

Thus, graduates who have gained practical experience and understanding of the dynamics of working in interdisciplinary teams through experiential learning have an advantage in a highly competitive and innovative ecosystem (Skills 4 Employability, 2020).

Graduates who have broad-based interdisciplinary team experience will possess enhanced employability skills that are highly relevant to employers (Bejaković, & Mrnjavac, 2019; Dale & Newman, 2005). There are various benefits of facilitating interdisciplinary team collaborations in higher education. These include:

- In terms of the labour market itself and interdisciplinary employability skills, there is a growing demand for boundary crossing competences (Oleksiyenko, 2013). Moreover, there are an increasing number of roles in interconnected spaces

such as policy, science, health care, government and business (Dalrymple, Macrae, Pal & Shipman, 2021; Keville et al, 2017; UN Environmental Programme, 2008).

- Interdisciplinary team working prepares students for multidimensional global issues and professional landscapes (Millar, 2016).
- When exposed to interdisciplinary learning, perceived student employability skill gains increase (Hart, 2019). Actual skills gains acquired include complex problem-solving, ability to see different perspectives and transferable skills (Ali, Murphy & Nadkarni, 2018; de Greef, Post, Vink & Wenting, 2017; Lin-Stephens, Smith, Richards, Pang, Uesi, & Athanasou, 2017; Pigden & Jegede, 2020).

However, to date, limited research has been carried out regarding how interdisciplinary teams work together and how educators can facilitate cohesive team working and learning.

University of Leeds Innovation Thinking and Practice Module

This project takes significant input from the University of Leeds flagship LUBS3990 "Innovation Thinking and Practice" module. The module aims to enhance student employability through the development of a range of skills highlighted by employers as sometimes lacking in graduate candidates and hires.

The skill areas covered align with industry reports on critical and future skills needs (WEF, 2020). They include creative problem solving, collaboration and team working, communication skills, commercial awareness, managing change and developing resilience.

Students are grouped into diverse interdisciplinary teams. Team allocation is principally based upon discipline, but also takes into account additional characteristics such as gender and culture. Each team is assigned a real-world innovation challenge to address. The challenges are developed in collaboration with experts from industry, government, and non-profit organisations.

The module guides students through a series of facilitated activities to progress their project. Activities include researching the challenge area, developing empathy for stakeholders, generating and prioritising ideas, developing prototypes and commercial value and communicating innovation, including pitching to industry and academic experts.

To deepen and surface their learning, students write weekly reflective journals and a final reflective essay, which is used for summative assessment. The reflective nature of the journals and assignment essays provides a rich source of data for the project.

Methods

This sub-project includes a review of existing contemporary research into teaching and learning of diverse interdisciplinary teams during team-based activities and projects.

The project uses qualitative methods to provide evidence, taking input from data obtained (with student permission) from the University of Leeds "Innovation Thinking and Practice" module.

Inputs include:

- 56 x anonymised 3,500-word student assignment papers – in which students reflect upon their experience and learning from participating in their team-based project
- 56 x 10 anonymised weekly reflective student journals (10 weekly reflective journals for each student), in which students reflect upon their experience and learning from participating in the previous week's activities of their project
- 12 x semi-structured interviews of student alumni – in which alumni answer questions related to their experience and learning from participating on the module and project

All three of these data sources were analysed using thematic analysis, which was undertaken due to its flexibility, as well as its dynamic potential. Using NVivo qualitative research analysis software, a number of themes were developed and adapted according to observations within the data, attempting to find a meaning for the comments using an interpretivist approach between the various themes. Interpretation and development of the report were then undertaken as described by Braun and Clarke (2022).

A series of datasheets were extracted for use in each sub-project. The datasheets analysed in this sub-project include:

- Datasheet A – NVivo output of all assignment and reflective journal material coded with "Teamwork" node
- Datasheet E - NVivo output of all student assignment and reflective journal material coded with "Diversity" node
- Datasheet F - NVivo output of all interview material coded with "Diversity" node

The datasheets were reviewed and analysed in detail. Analytical memos were created highlighting key themes and evidence. For this sub-project, focus was placed on evidence related to teaching and learning during interdisciplinary team-based projects, along with insights which can be used to create practical recommendations for teaching and learning.

Findings

Thematic analysis generated from the assignments, weekly reflective journals and interviews revealed evidence of challenges and opportunities faced by diverse and interdisciplinary teams, along with practical strategies students adopt to collaborate with each other.

A number of additional challenges and opportunities for student learning during team-based activities and projects were also identified and analysed. While these areas are relevant for diverse and interdisciplinary teams, the findings and recommendations are equally applicable for wider team-based activities.

The findings have been analysed to identify approaches educators can take to enhance teaching and learning for students working on team-based activities and projects.

Although not a core objective of the sub-project, a number of benefits for student learning and development from working in diverse interdisciplinary teams have been documented due to the wealth of evidence gathered in this area. Identifying the benefits may enable the development of further recommendations for educators.

The findings have been categorised into the following areas:

1. Challenges and opportunities for student learning when working in diverse teams on team-based activities and projects.
2. Challenges and opportunities for student learning specifically when working in interdisciplinary teams on team-based activities and projects.
3. General challenges and opportunities for student learning when working on team-based activities and projects.
4. Benefits for student learning and development from working in diverse and interdisciplinary teams.

1. Challenges and opportunities for student learning when working in diverse teams on team-based activities and projects

In the reflective journals, assignment essays and interviews, students highlighted a number of challenges and opportunities encountered when working in diverse teams. The main themes identified are described below, along with example student statements and implications for teaching and learning.

1. **Finding:** Students benefit from getting to know their teammates early during a project / module.
    - Example evidence:

- "If I were to do the project again… I would aim to get to know other team members as early in the project as possible as I noticed a large improvement in our project work after we had developed relationships." (ID02 / Data Sheet E / Ref 5)
- "Most of my team were very shy at the beginning of the project. Therefore, I tried to get them engaged in the task and I found that once you began a simple conversation about generic (non-work related) topics, they began to open up. This meant they worked better as a team member and were inclined to get involved with team discussions." (ID09 / Data Sheet E / Ref 1)
- "Taking time to develop relationships with others is beneficial as it builds confidence and encourages the sharing of knowledge and expertise." (ID02 / Data Sheet E / Ref 8)
- "I am pleased that I had built up good relationships with the group so that we were all able to lean on each other for support. It demonstrated to me the value of building up good rapport with the people you are working with." (ID19 / Data Sheet A / Ref 9).

- **Implications for teaching:** Provide students with opportunities to "break the ice" and get to know their teammates early during a project / module.

2. **Finding:** Cultural differences between team members can create challenges but also offer significant opportunities for student learning and development.
    - Example evidence:
        - "Despite some finding the cultural barriers a challenge, I found that it only ever added to our project - the cultural diversity allowed us to view the challenge from different perspectives. For example, when analysing the current flaws in our healthcare system, we dissected the positives and negatives of other group members' experience abroad, which helped spark ideas." (ID19 / Data Sheet E / Ref 2)
        - "The team comes from different places around the world and therefore it was beneficial to see how we can compare our knowledge in commercial and intercultural understanding... However, there were some challenging moments as well." (ID22 / Data Sheet E / Ref 2)
        - "I didn't fully understand the culture and socio-political context in the UK. Whenever that happened, our team developed new ideas using my suggestions and the knowledge of local members. Through this

process, I realized that the diverse perspectives of team members from various backgrounds create unique and applicable solutions." (ID32 / Data Sheet E / Ref 1)

- "We had members from Asia, the UK and Sweden in our team and this led to increased differential inputs throughout the collaboration process... In the future, I shall encourage the selection of deeply culturally diverse teams for creative and innovative projects as well as embracing diversity in working methods and perspectives." (ID13 / Data Sheet E / Ref 1)

- **Implications for teaching:** Provide opportunities for students to identify and understand their own and their teammates' cultural differences and to understand the implications and opportunities presented by this.

3. **Finding:** Personality types can be a barrier to engaging in team-based activities, for example for introverted students.
    - Example evidence:
        - "As we progressed and felt able to be more direct with each other, our meetings became more focused and productive... I valued learning more about the differences between introvert and extrovert ways of working." (ID02 / Data Sheet E / Ref 11)
        - "I made sure this week to ensure quieter members of the group got involved. It is a lesson I have learnt through the module and will look to continue to apply it going forward." (ID04 / Data Sheet E / Ref 6)
        - "When I next complete group work, if group members are silent, I want to ask questions and offer support to quieter members to help them improve and alleviate their barriers to communication." (ID08 / Data Sheet E / Ref 6)
        - "My last key lesson was learning to work with introverts. Most of my team were very shy at the beginning of the project. Therefore, I tried to get them engaged in the task and I found that once you began a simple conversation about generic (non-work related) topics, they began to open up. This meant they worked better as a team member and were inclined to get involved with team discussions." (ID09 / Data Sheet E / Ref 1)
    - **Implications for teaching:** Provide opportunities for students to identify and understand their own and their teammates' personality types, and

understand the implications and opportunities presented by this. Provide mechanisms to enable different personality types to work effectively together.

4. **Finding:** Not having English as a first language can be a barrier to engaging in team-based activities (in institutions where English is the taught language and the first language of other members of a team).
    - Example evidence:
        - "We had members whose English was not as developed as others. Their silence was because they were struggling to understand." (ID08 / Data Sheet E / Ref 6)
        - "The group work in this course made me feel the impact of cultural difference, which is often mentioned in business studies. For example, it is difficult to understand slang because of the language barrier." (ID37 / Data Sheet E / Ref 1)
        - "It also gave me a chance to learn to change the way I speak to other members when English is not their first language… this module has made me realise why. I think I have become more compassionate for members who don't speak English as their first language." (ID35 / Data Sheet E / Ref 6)
        - "I truly realized the importance of communication. In order to complete a project, I learned that I had to be with so many different people and that communication with them must be smooth. Therefore, in order to work on the world stage, I will learn various cultural rules and practice more ways to empathize to develop my English skills, which are the basis of communication, and to consider the minds of various people." (ID 32 / Data Sheet A / Ref 4)
    - **Implications for teaching:** Provide support and guidance for students where English is not their first language and mechanisms to aid their input in team-based activities. Provide support for students where English is their first language to have empathy for their teammates.

2. Challenges and opportunities for student learning when working specifically in interdisciplinary teams on team-based activities and projects

In the reflective journals, assignment essays and interviews, students highlighted a number of challenges and opportunities encountered due to specifically working in interdisciplinary teams. The main themes identified are described below, along with example student statements and implications for teaching and learning.

1. **Finding:** There are practical issues around scheduling and delivery of out of class team-based activities due to different timetables in different disciplines, courses and time zones.
    - Example evidence:
        - "One of the main challenges we are facing is finding convenient times for team meetings." / "As there are so many team members and our timetables conflict, we are very limited on the amount of time we can meet for." (ID52/ Data Sheet E / Ref 17 & Ref 22)
        - "Working in a group of people studying different subjects with different timetables made it extremely difficult to find times to meet and meant that when we did, we had to use the time efficiently." (ID21/ Data Sheet F / Ref 1)
        - "The team had different timetables. However, I learned how to manage competing tasks. For example, we split tasks into smaller areas, so each team member worked on a different part to work more efficiently. I also allocated time in my schedule to have dedicated time to work on my tasks, as a result I completed group work in time for our weekly meetings and worked productively." (ID05 / Data Sheet E / Ref 1)
        - "Deciding an optimum time for our group meetings was surprisingly more complicated due to our varied and busy schedules as well as facing the issue of numerous time zones being involved. Initially we decided that using Microsoft Teams would be best due to the team's shared familiarity. We did struggle at what specific time to meet due to our uncoordinated approach in finding a compromise however eventually every team member amalgamated our timetables which meant that finding the best time was significantly easier and we set a schedule for the oncoming weeks." (ID52 / Data Sheet A / Ref 1).

- **Implications for teaching:** Provide students with support and guidance for scheduling out of class activities. Provide students with additional support and guidance for doing so. Provide students with support and guidance for "surfacing" their learning in this area.

2. **Finding:** Students adopt a range of strategies for division of team-based activities across team members, including making use of their core disciplines.
    - Example evidence:
        - "Many of my teammates were of a computer-science background and had completely different skillsets.... The benefits of this were two-fold, firstly we could take advantage of each other's strengths, using their computing skills to develop an advanced digital prototype using new software, whilst using my business expertise to better understand the commercial background and funding aspect of the innovation." (ID46/ Data Sheet E / Ref 2)
        - "Our group had people with completely different degrees that had different areas of expertise to add to the group project. One member was a computer scientist and was fundamental in helping the team understand AI technology and what it could do. This allowed our team to develop ideas we would not have been able to if she were not on the team." (ID02 / Data Sheet E / Ref 11)
        - "We also delegated some tasks to members with skills in computing and design in order to deliver the best visual representation of our products. Alongside this, the business case and other parts have been given to myself and other business orientated members. This was an effective way of sharing the workload." (ID13 / Data Sheet E / Ref 5)
        - "Every member of my team had different skills and knowledge in different areas of study, bringing a distinct perspective to the table… For example, one of the members was doing product design and helped us with the drawings and design for our prototype. Additionally, my knowledge of International Business and Marketing and the other students' knowledge in economics helped us to determine our business case. Having a diverse team helped me learn new skills from others, and I got to share my knowledge with the rest of the team." (ID39 / Data Sheet E / Ref 2)

- I further developed a clearer view about how we can divide tasks to maximise our own experience and also bring the best we can to the group work. We should know who is capable of what in the group, and decide who is most suitable for roles including facilitator, idea-generator, summarizer, evaluator, mediator, encourager, recorder. I have observed and reflected on many of these during my group work time. (ID43 / Data Sheet A / Ref 4).

- **Implications for teaching:** See implications described beneath the next finding.

3. **Finding:** There can also be challenges from dividing team-based activities based upon core disciplines.

    - Example evidence:

        - "Being from different subject areas helped us delineate team roles; computing students created the prototype; business students created the presentation script, and architecture students designed the slides. Although this helped increase group efficiency, we did not use our diversity to its full potential. I was frustrated as I wanted to help, but I did not have the knowledge to do so. I felt disheartened when I could not give advice on the prototype as I did not understand the software. This resulted in tasks taking longer to complete and an uneven workload. If I could do the project again, I would suggest individuals from different topic areas collaborate. This would enable the lesser skilled member to enhance their skillset by working with someone more knowledgeable, and the other member can share their workload." (ID08/ Data Sheet E / Ref 5)

        - "Having team members who had additional knowledge and experience in this space made the module content and project feel more accessible and manageable. Additionally, by being able to complete tasks confidently and quickly, I could use the extra time I had gained to learn more about the less familiar content. Each member focusing on their perceived strengths helped bring a sense of balance to the project itself and meant that our final presentation and business case had equally compelling elements from both computing and business disciplines." (ID19 / Data Sheet E / Ref 23)

        - "Three of us were Business students and one a Computer Science student, so we did not know much about prototyping. However,

instead of dividing our tasks, we decided to work together on the prototyping process so that we all know how it is done, and we can try to contribute any idea during that process as well." (ID43 / Data Sheet E / Ref 7)

- **Implications for teaching:** Provide students with support and guidance on the benefits and implications of allocating workload by discipline and the benefits of sharing workload across disciplines. Provide students with mechanisms to make informed team-based decisions about sharing workload between team members.

3. General challenges and opportunities for student learning when working on team-based activities and projects

A number of more general challenges and opportunities for student learning during team-based activities and projects were identified. While these are all relevant for diverse and interdisciplinary teams, the findings and recommendations are equally applicable for wider team-based activities.

The main themes identified are described below, along with example student statements and implications for teaching and learning.

1. **Finding**: Establishing clear communications and common goals within a team is important for team success and student learning.
    - Example evidence:
        - "Ensuring messages are delivered and received accurately is a main point we need to be concerned with. Hence, to avoid this problem, using clear and concise language is one of the solutions, especially for a cross-culture team." (ID30 / Data Sheet E / Ref 2)
        - "Another element of communication I learned through the module was the importance of having a group direction and a shared common goal." (ID11 / Data Sheet E / Ref 3)
        - "As our team is working better and better, we reached a friendly communication environment where every team member is able to express their thoughts freely. As a result, our efficiency and productivity improved a lot." (ID44 / Data Sheet A / Ref 8).
        - "Additionally, I feel the team now has an excellent rapport, as everybody is able to act quite informally with each other and are

active on our private 'Whatsapp' group chat, asking each other questions and establishing deadlines we could all work towards." (ID20 / Data Sheet A / Ref 8).

- **Implications for teaching:** Provide students with support and guidance (including use of appropriate approaches and/or tools) to create clear communications within the team and develop common goals.

2. **Finding:** Students benefit from developing empathy for each other. This includes developing a greater understanding of other students' points of view and at times personal challenges.
    - Example evidence:
        - "Empathy is also important when working in a multidisciplinary team… During the initial weeks of the project, team members were reluctant to put forward their ideas and opinions. After taking time to see the challenge from others' perspectives we understood how they might feel differently about certain aspects due to their own experiences, all team members became much more engaged…" (ID02 / Data Sheet E / Ref 10)
        - "To work in a diverse team has taught me to be more patient und understanding when it comes to other people' ideas." (ID22 / Data Sheet E / Ref 7)
        - "Establishing a good relationship among the team was crucial to work towards our collective end goal." (ID10 / Data Sheet E / Ref 3)
        - "During today's meeting, one of the absent members messaged our group Facebook chat saying sorry I couldn't attend had another meeting and deadline today (summary). My response was 'Appreciate a heads-up next time. No problem if busy just keep us in the loop'… it's a little harsh but honest in the fact it conveyed that I felt let down by it. Next time, I will revise my response to have a bit more empathy." (ID5 / Data Sheet A / Ref 12)
        - "Previous to this meeting one of our team members had failed to send in her part of the team video and wasn't replying to our messages which was really frustrating. During the meeting, it came out that she had broken her wrist and elbow and been in A&E. It was a valuable lesson that you shouldn't jump to conclusions about what

is going on in other people's lives and there are often good reasons for people not submitting work." (ID21 / Data Sheet A / Ref 1)

- **Implications for teaching:** Provide opportunities for students to develop and encourage empathy for and between their teammates.

3. **Finding:** Students benefit from the development and use of active listening skills.
    - Example evidence:
        - "Instead of being annoyed I should have been a better active listener and asked questions to encourage a dialogue with individuals. When I next complete group work, if group members are silent, I want to ask questions and offer support to quieter members to help them improve and alleviate their barriers to communication." (ID08 / Data Sheet E / Ref 6)
        - "Despite some initial disagreements we listened to each other and communicated until we reached the correct conclusion, demonstrating the impact of effective listening in teams." (ID52 / Data Sheet A / Ref 2)
        - "This week I have learnt the importance of active listening and communicating with one another. Given we had to rethink our idea it was crucial we listened to everyone's opinions. This process brought us closer together, by listening to everyone's views we ensured everyone added value to the group project and made sure everyone agreed with one another. I believe group cohesion increased and we are a better team as a result." (ID 8 / Data Sheet A / Ref 4)
        - "Slight challenges were discussing the wording but everyone was reasonable and listening to each other, so the decision making was fairly easy." (ID7 / Data Sheet A / Ref 8).
    - **Implications for teaching:** Provide opportunities for students to learn and develop active listening skills.
4. **Finding:** Encountering conflict during team-based activities can be a useful learning experience.
    - Example evidence:
        - "Sometimes the difference in approach did lead to conflict over certain large decisions. This is where I gained useful experience and

knowledge of having to negotiate a difference of opinion whilst working on a joint project." (ID52 / Data Sheet E / Ref 1)

- "The conflict element we had to deal with, and so I think, really, the learning was, for me I can be shy, but sometimes I don't like conflict and I guess it was that opportunity for me to practice in a safer environment. I now know how to deal with that conflict, which I think was a big learning for me." (ID60 / Data Sheet F / Ref 3)
- "I've noticed there is one group member that constantly criticises other people's ideas but doesn't actually contribute many of his own, going forward I might have to single this person out to be more constructive rather than destructive." (ID46 / Data Sheet A / Ref 4).
- "During the actual workshop, the group suffered from two differing opinions of what the actual idea we had was. One more vocal member of our group was convinced it was a different solution and led the group exercises under that presumption. That left the rest of us very confused for the rest of the session as we were unsure what this member was talking about. After the first exercise, I asked the whole group to pause and let the member clarify what idea they were pursuing. After this, we clarified with them what idea we were actually implementing and this made our storyboarding exercise a lot easier." (ID4 / Data Sheet A/ Ref 6).

  - **Implications for teaching:** Inform students that conflicts will sometimes happen within teams, that this is normal, and it can lead to positive learning experiences. Provide students with support and guidance for overcoming and learning from conflict and "surfacing" this learning.

5. **Finding:** Less motivated team members can be an issue during team-based student projects, but there are ways in which students can motivate each other.
   - Example evidence:
     - "There were people who were motivated and then others who didn't really care. The learning experience for me was that even if you have someone on the team who isn't as motivated, you should still bring them along. But don't try too hard… give them the opportunity to work collaboratively, but if they're not going to then don't stress yourself out about it and kind of leave them to it, because otherwise it can kind of have a knock-on effect." (ID59 / Data Sheet F / Ref 1)

- "You also had people who had less motivation… I think that was quite challenging. Even though the final grade was based upon the assessment, not the teamwork as such, it provided hurdles along the way. (ID60 / Data Sheet F / Ref 3)
- "I personally struggled when I saw teammates lose interest towards the end of our meeting. From engaged to slouching/ lying back to sitting on mute. The meeting did overrun by a few minutes but I felt it was rude." (ID12 / Data Sheet A / Ref 1).
- "I'll make sure to next time attempt to bring everyone's morale back up, whether by making a joke here and there or by attempting to make them excited by our new idea again." (ID15 / Data Sheet A / Ref 6) / "Have fun, bringing good vibes because it rubs off on the group and quality of work." (ID12 / Data Sheet A/ Ref 2).

- **Implications for teaching:** Provide mechanisms to motivate all students and for teams to address issues with less motivated students. Ensure assessment is designed so that more motivated students are not penalised due to the impact of less motivated members of the team.

6. **Finding:** Students benefit from developing professional administrative practices for team-based meetings.
   - Example evidence:
     - "The importance of a clear agenda and pre meeting prep for the meeting is this week's key learning point because it stops you going round in circles and means people have something to share that is useful (grounded in research) and not purely an opinion / speculation." (ID12 / Data Sheet A / Ref 5).
     - "I began to feel frustrated twenty minutes into the meeting as we had not been overly productive. To overcome this, I made an agenda for the rest of our allocated time." (ID19 / Data Sheet A / Ref 6).
     - "This makes me realise that having an active person who takes the leading role is important to keep everyone on track. Another important factor that made us finish our work on time is that everyone was actively communicating." (ID 43 / Data Sheet A / Ref 1)
     - "The importance of being organised from the start helps massively to prevent letting down my team members." (ID1 / Data Sheet A / Ref 1).

- "The team is in tune and switched on, project time is focused on the project. Next time I will make sure to have little check ins every 10-20 minutes just be like 'so team are we all on the same page'." (ID12 / Data Sheet A / Ref 2).

- **Implications for teaching:** Provide support and guidance and opportunities for students to practice running effective meetings and "surfacing" this learning.

7. **Finding:** Students utilise different mechanisms for addressing issues due to absenteeism of team members.
   - Example evidence:
     - "Another challenge we faced as a team was the absence of one team member for the first workshop. Coming from a small course in which everyone knows each other, I had not encountered this problem before. We took the advice from the module leaders to be proactive if this was the case. I sent an email to the team member and asked them to provide their details so they could be included in the group chat." (ID2 / Data Sheet A / Ref 1).
     - "Unfortunately, one of our group members could not attend the final presentation. However, he made a great effort on preparing the presentation and they helped us practice our presentation." (ID44 / Data Sheet A / Ref 10).
     - "Earlier in the week we had a practice run and two members of our group did not show up. As a team we felt worried but soldiered on. One member of the team who had provided a great contribution did not feel well and we accommodated her by taking over some of her slides." (ID48 / Data Sheet A / Ref 10)
     - "This week we had POOR attendance. Of the group, we managed to have 3 members participating in the lecture. More significantly, our computer scientist who was a key asset to our team was absent. This was disappointing as they had the most knowledge of how AI works and could have helped us dramatically with the new idea screening. However, we persisted. By having a smaller group, we were better able to focus on the problem of cost and accessibility, not necessarily technology." (ID11 / Data Sheet A / Ref 5).
     - "After the workshop, we went back to our WhatsApp group chat to communicate to the rest of members what we had done during that

session, but also, we communicated our frustration about them not telling us that they would be missing the session on that day. As a team we have agreed that if by any reason someone is going to miss the workshop, they should let the rest know at least 3 days before so the rest can be ready for whatever it is prepared for us in the workshop." (ID39 / Data Sheet A / Ref 4).

- "My team met in person to discuss the project. Due to conflicting timetables, I was unable to attend. Before the meeting, I added my notes onto the Mural so they were accessible to the rest of the team. Following the meeting, the group's notes have been shared with me. I have appreciated the teamwork involved in ensuring I am not at a disadvantage." (ID2 / Data Sheet A / Ref 2).
- "Upon discussing the presentation and the events of the workshop, the team generally reported our presentation was successful and they were pleased with the result. They also broke down the events within the workshop so whilst I felt I had missed out on certain experience, I was not left out of the loop and was fully informed of the team's actions and thoughts, for which I was grateful." (ID52 / Data Sheet A / Ref 4).

- **Implications for teaching:** Provide students with encouragement to deal with absent member issues themselves and offer additional support and guidance if necessary.

3. Benefits for student learning and development from working in diverse and interdisciplinary teams.

In the reflective journals, assignment essays and interviews, students highlighted a number of benefits encountered when working in diverse and interdisciplinary teams. The main themes identified are described below, along with example student statements and implications for teaching and learning.

1. **Finding:** Students benefit from and value working in diverse and interdisciplinary teams.
    - Example evidence:
        - "I learnt a lot from just talking to my peers in my group who studied different courses." (ID07/ Data Sheet E / Ref 4)

- "One of the points was speaking to people outside of my course of product design… We hibernate to live within our little huddled people. And when we came out of that, we went to business school and worked with people studying different the various business courses and it was quite an eye-opener in terms of how they approached us and where their priorities were." (ID58 / Data Sheet F / Ref 1)
- "Everyone is specialised in different fields. Therefore, when discussing ideas, we can have much broader views on things. People often have the intention to work with people who are similar to them to reduce conflict. However, I realise that if we know how to collaborate on ideas, we can make use of the difference and come up with many great ideas." (ID43/ Data Sheet F / Ref 4)
- "Working in diverse teams has helped reach a goal which may have not happened if we were working individually. Using different skills sets and having a range of different knowledge helped improve productivity to get tasks completed to a high standard and helped achieve exceptional solutions." (ID45 / Data Sheet E / Ref 3)
- "It is very interesting to see how people from completely different backgrounds and courses have completely distinctive perspectives on the issue as well as how to solve it, and the assumptions they made. From this point on, I will always attempt to insert myself in teams that are as diverse as possible." (ID15 / Data Sheet E / Ref 2)
- "Throughout our project, I saw the benefits of being part of a diverse team, with every member having different skills and experiences they were able to contribute. This enabled a wide range of ideas to be produced as everyone tackled the problem from different angles. I also found it useful that one member's weakness might be someone else's strength. For example, answering follow-up questions on the spot is one of my weaknesses but other members of my group were able to do this with ease." (ID21 / Data Sheet E / Ref 2)
- "I have been able to see this in place due to the diverse nature of my team, not just in nationality but also in the perspective they bring through their different courses – allows a team to come up with varying ideas." (ID19 / Data Sheet E / Ref 4)

- "Another decisive and important aspect was working in a heterogeneous team with a variety of backgrounds. Our group consisted of three girls and two boys from different faculties. Our backgrounds in marketing management, international business and product design allowed us to work in synergy… coming into contact with those who are different from you gives you the opportunity to broaden our horizons, open your minds and see the world from a different point of view." (ID26 / Data Sheet E / Ref 1)
- "The benefit of having a diverse team with members across different disciplines and backgrounds is highly advantageous. I noticed in my team, that had members from different schools, genders and backgrounds, everyone's ideas differed due to these variables and helped create more fully formed ideas… I could see each of us pulling ideas from different places other members cannot reach." (ID28 / Data Sheet E / Ref 1)
- "I was part of an innovation team comprised of students from many different courses which converged well and combined specific skills to gain the best position we could in terms of being able to constantly innovate our service. Having a team of very different minded people with differing sets of skills, enabled us to combine powers and create synergy to allow the best possible solution, which each one of us would have not been able to do individually." (ID42 / Data Sheet E / Ref 1)
- "It was also beneficial to work in a team with people from different disciplines because it was very teamwork orientated. When it comes to the world of work, people come from all sorts of backgrounds, whether it's educational, academic, or just culturally different backgrounds. I think it really helped to kind of bring that together. I think as well that it definitely taught me those collaboration skills and how to kind of innovate collaboratively." (ID64 / Data Sheet F / Ref 1)
- "The significance of taking advantage of our team's diversity and how that can assist us in working in various ways which boost productivity was highlighted. This inferred not only how important this will be on this module but made me comprehend how this may help in other modules even if unmentioned by other module leaders." (ID41 / Data Sheet F / Ref 3)

- "I can remember still the names of the people who were in my group. I can remember the table that we sat on every single week. If I think back to most of my modules, I probably would struggle to remember 95% of them… And I actually think with this module that there have been elements that I've taken into the working world with me. Mainly that team working element, the cultural differences, the stakeholder awareness." (ID60 / Data Sheet F / Ref 6)
- "There's a tendency when you do group work at university… you surround yourself with people that you know and you're already friends with them and they think the same way as you whereas being put in groups where you're with a purposefully diverse group of people from different disciplines has massively helped me… I think it really helps with that with being open and appreciative of different perspectives. I think the module really helps you to appreciate that. Everybody's coming from a different perspective and background and actually, you end up with a better outcome because of that and that's definitely how I felt at work now, but I would say this module definitely helped with that learning and appreciation, now that I'm in work." (ID62 / Data Sheet F / Ref 2)
- "In my current job, I work with people throughout the world… if I hadn't been on a module like that, actually I probably would have struggled to that sort of environment, because it would be a little bit of a shock and quite a big difference culturally… working with a group for that whole kind of semester just really kind of makes you, you know, learn and be more appreciative of people's differences." (ID60 / Data Sheet F / Ref 2)

- **Implications for teaching:** Provide students opportunities to work in diverse and interdisciplinary teams. Select team members carefully to maximise the diversity of the group.

Discussion and Implications for Practice.

This section focuses on how the findings can be used to create practical and evidence-based recommendations for enhancing teaching and learning when students are working in diverse and/or interdisciplinary teams on team-based activities and projects.

To make the recommendations as practical and usable as possible, they have been deliberately designed to be short and sharp. There are many possible options to implement the recommendations, but examples have been included to offer a level of guidance.

The recommendations here have been extracted from the previous section and can be summarised as follows:

1. Recommendations for improving teaching and student learning when working in diverse teams on team-based activities and projects

- Provide students with opportunities to "break the ice" and get to know their teammates early during a project / module.
    - Example – Task students with creating a fun team video in where they introduce themselves, discuss how they plan to work together and reveal their team's name (this is used in the Innovation Thinking and Practice module).
    - Example – Make use of a fun team-building activity such as Lego Serious Play (see blog) or Pizza making (link to be added once available).

- Provide opportunities for students to identify and understand their own and their teammates' cultural backgrounds and differences and to understand the implications and opportunities presented by this.
    - Example – Encourage students to discuss their backgrounds as part of the process of getting to know each other and to explore how their diversity can provide opportunities to help their project.

- Provide opportunities for students to identify and understand their own and their teammates' personality types, and understand the implications and opportunities presented by this – both in terms of team-based activities and graduate recruitment.
    - Example – Share resources with students regarding psychometric tests.
    - Example – Give students the option to undertake free psychometric tests (such as 16 Personalities) to better understand their own personalities.

- Example – Encourage students to discuss their different personality types with each other and to explore how their diversity can provide opportunities to help their project.

- Provide mechanisms to enable different personality types to work effectively together.
  - Example – Use diverge-converge techniques to foster inclusion and diversity by, for example, encouraging less confident and more introverted students to engage in team-based activities.
  - Example – Teach students how to practice empathy and active listening and encourage them to apply these for example, to encourage less confident and more introverted students to engage in team-based activities.

- Provide support and guidance for students where English is not their first language and mechanisms to aid their input in team-based activities. Provide support for students where English is their first language to have empathy for their teammates.
  - Example – Use diverge-converge techniques to foster inclusion and diversity by, for example, encouraging students where English is not their first language to engage in team-based activities.
  - Example – Teach students how to practice empathy and active listening and encourage them to apply these with students where English is not their first language to support their engagement with the team.

2. Recommendations for improving teaching and student learning when working specifically in interdisciplinary teams on team-based activities and projects

- To address timetable challenges:
  - Provide students with support and guidance for scheduling out of class activities.
    - Example – Highlight how simple tools such as Doodle Polls can be used effectively to find mutually convenient timeslots.

  - Provide students with additional support and guidance for delivering out of class team-based activities.
    - Example – Discuss how students can breakdown tasks and assign them to sub-groups of students with similar timetables.

- Provide students with support and guidance for "surfacing" their learning in this area.
    - Example – Discuss with students how scheduling team-based activities is a real-world challenge in many organisations.
    - Example – Encourage students to reflect on the challenges they have encountered and how they overcame them, and to create stories to share with potential employers at interview.

- To address workload allocation and distribution challenges:
    - Provide students with support and guidance on the benefits and implications of allocating workload by discipline and the benefits of sharing workload across disciplines.
        - Example – Encourage students to share their personal learning goals with each other.

    - Provide students with mechanisms to make informed team-based decisions about sharing workload between team members.
        - Example – Encourage students to make team-based decisions on whether to allocate tasks by discipline and/or buddy up students in different disciplines to foster cross-discipline learning.

3. General challenges and opportunities for student learning when working on team-based activities and projects

- Provide students with support and guidance to create clear communications (including use of appropriate approaches and/or tools) within the team and develop common goals.
    - Example – As part of initial team bonding and planning, encourage students to agree how they will communicate with each other, what they expect from each other's communications and the tools they will use.
    - Example – Encourage students to share their personal learning goals with each other and develop a common set of goals for the team.
    - Example – University of Leeds Library resources on group work.

- Provide opportunities for students to develop and encourage empathy for and between their teammates. Provide opportunities for students to learn and develop active listening skills.

- Example – Teach students how to practice empathy and active listening and encourage them to apply these with their teammates and wider stakeholders, including the teaching team.
- Example – University of Waterloo – Being an Effective Group Member.

- Inform students that conflicts will sometimes happen within teams, that this is normal, and it can lead to positive learning experiences. Provide students with support and guidance for overcoming and learning from conflict and "surfacing" this learning.
    - Example – Discuss with students how conflict in team-based activities is a real-world challenge in many organisations and projects.
    - Example – Provide students with resources to analyse and address team-based conflicts, such as a Teamwork Diagnostic Tool based upon Lencioni's 5 Dysfunctions of a Team / University of Waterloo – Being an Effective Group Member.
    - Example – Encourage students to overcome conflict themselves before requesting support from the teaching team.
    - Example – Encourage students to reflect on the challenges they have encountered and how they overcame them, and to create stories to share with potential employers at interview.

- Provide mechanisms to motivate all students and for teams to address issues with less motivated students. Ensure assessment is designed so that more motivated students are not penalised due to the impact of less motivated members of the team.
    - Example – Use of peer scoring and evaluation approaches for team-based assignments.
    - Example – Base assessment on individual student rather than team-based assignments.

- Provide support and guidance and opportunities for students to practice running effective meetings and "surfacing" this learning.
    - Example – Discuss with students how running effective meetings is a real-world challenge in many organisations and projects.
    - Example – Provide students guidance on how to run effective meetings – many articles, guides and blogs exist – here's one example.

- Example – Encourage students to reflect on the challenges they have encountered and how they overcame them, and to create stories to share with potential employers at interview.

- Provide students with encouragement to deal with absent member issues themselves and offer additional support and guidance if necessary.
  - Example – Encourage students to reach out and engage with absent students and have empathy for them.
  - Example – Encourage students to engage absent students themselves before requesting support from the teaching team.

Conclusion

This sub-project has identified clear benefits for students of working in diverse and interdisciplinary teams on team-based activities and projects. Evidence has also been gathered of a number of specific challenges and learning opportunities which arise from this.

A series of recommendations have been made which can be used by educators to enhance teaching and learning, improve student learning experiences and enhance skills development.

Next steps

It is proposed to use the output of this sub-project as follows:

1. Communicate the benefits and specific recommendations identified for enhancing teaching and learning of diverse interdisciplinary team-based activities and projects
   - Creation of this report as a summary for LITE
   - Creation of a presentation and supporting video summarising the findings, a case study example based upon the LUBS3990 module and practical instructions to enable educators to apply the recommendations on their own modules and activities – for use by LITE and at faculty specific and cross-faculty events

2. Wider dissemination of the findings of the sub-project
   - Creation of pedagogical paper(s) to be targeted to appropriate journal(s)

- Delivery of an external speaker session at the Advance HE Teaching and Learning Conference in July 2023 and potentially other events and conferences

The findings of the sub-project will also feed into the overall findings, work and next steps of the wider LITE I-DE-ES Fellowship project.

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