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Approach to Supporting Online Project-Based Courses: An Educator's Perspective

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CONTEXT
Project-based learning provides engineering students with the opportunity to engage with real-world problems through authentic assessments. Project-based learning has always been challenging for students to navigate, as projects typically require them to be undertaken in groups. There have been numerous successful frameworks and implementations for on-campus students; however, they are typically not suitable for online project-based courses. As such, management of project courses has consistently presented challenges, including a lack of engagement, competing perspectives, and ineffective communication. Difficulties typically arise when students fail to contribute to their project, necessitating a reduction in the scope or grade for non-participating students. Without the need to physically attend classes in person, it is challenging to monitor and track progress in real-time and quickly address problems or issues as they arise.

GOAL
The principle of this paper is to explain the current framework for a new method of facilitating online project groups for online students, utilising Microsoft Teams and a seven-part framework. The primary objective of this new method was to achieve better outcomes for student projects by providing faster access to academics, ensuring increased accountability among team members, while reducing the workload of facilitating groups from the academics' perspective.

APPROACH
A framework for integrating group facilitation sessions was developed by surveying the literature on on-campus approaches, coupled with previous educational experiences from academics who have vast practice facilitating large, online group projects. The framework utilised several digital technologies, with synchronous and asynchronous weekly meetings.

OUTCOMES
Having dedicated synchronous times to check in with online students at a time convenient to them was a key success factor, as group issues could be addressed throughout the teaching process, rather than at the conclusion of the project and course. This framework was successful in reducing the group issues and conflicts throughout the project. Whilst there was more in-person time required by the teaching staff, this model led to a lower administrative load and was distributed throughout the project, rather than at the end.

SUMMARY
The framework developed enables high-quality facilitation sessions in large first-year courses, which can be easily translated and scaled for use in later years and other disciplines. The use of Microsoft Teams enabled students to be accountable for their presence throughout the project, thanks to the increased visibility of their interactions. File-sharing problems and contribution issues were significantly reduced due to this new approach.

KEYWORDS
Project-based learning, authentic assessment, Microsoft Teams, facilitation

Introduction

Facilitating large project-based learning (PBL) courses involves a unique set of challenges, particularly when working with first-year engineering students. Despite these complexities, such courses remain a foundational part of many engineering curricula due to their effectiveness in building both technical and transferable skills (Crawley et al., 2014; Quince et al., 2024; Quince et al., 2023). Institutions globally have integrated PBL into early coursework to cultivate essential skills such as teamwork, communication, and problem-solving, which are identified as crucial for engineering graduates by the Washington Accord and Engineers Australia (Baillie & Fitzgerald, 2010; Male et al., 2011).

These courses typically involve team-based assessment tasks and collaborative problem-solving, which have been shown to significantly enhance student engagement and learning outcomes (Litzinger et al., 2011). However, group work introduces variability in outcomes due to interpersonal conflict, mismatched motivations, and differing learning approaches. Willey and Gardner (2010) found that both self-selected and randomly assigned groups experience performance issues unless group processes are explicitly taught. Moreover, curriculum development frameworks emphasise the need for scaffolding group dynamics to ensure equity in participation.

Prior to the COVID-19 pandemic, most of these courses were delivered in person, allowing students to meet during and outside scheduled classes and easily consult with instructors. This in-person model provided critical informal feedback loops that enhanced learning and reduced coordination costs (Fleischmann, 2018). However, the transition to online learning highlighted significant access and equity issues, especially for students from non-traditional or underserved backgrounds. During 2020 and 2021, it was repeatedly emphasised that online formats often remove the spontaneous interaction that supports collaborative learning. In online environments, teams must rely on digital platforms not only for communication but also for co-creating and visualising ideas. The physical classroom tools, such as whiteboards, sticky notes, and quick verbal check-ins, do not translate seamlessly to their virtual equivalents. Some have argued that unless digital literacy and platform familiarity are built into the course design, online PBL risks isolating team members and reducing project authenticity (Borrego et al., 2013). Even tools such as Microsoft Teams, which offer channels, task boards, and live collaboration, require thoughtful integration with pedagogy to avoid becoming mere logistical tools rather than learning enablers.

Given the increasing diversity among engineering cohorts and the growing need for hybrid delivery options, it is crucial to develop robust frameworks that facilitate online project management (Quince & Phythian, 2023). The 2035 Engineering Futures Report (Crosthwaite, 2021) calls for education models that are flexible, inclusive, and capable of preparing students for technology-dominant work environments. While significant work has explored transferable skills and online pedagogy independently, there is a notable gap in understanding how digital collaboration tools can systematically support project-based engineering education, particularly in the first year. The aim of this research is to document best practice by developing a pedagogically grounded framework for facilitating large online project courses using Microsoft Teams.

Pedagogical approach

Effective facilitation in first-year engineering project-based learning (PBL) requires a deliberate balance between academic guidance and student-led activity. Academics must go beyond delivering content and instead act as facilitators who structure opportunities for students to develop self-regulation, teamwork, and leadership skills (Finelli et al., 2010). As students progress through early project cycles, the academic presence should gradually recede to allow increased ownership of learning. This supports the view that facilitation sessions should be a blend of academic and student leadership, with a primary focus on student needs (Arendale, 2022). Equally important is the requirement for students to engage in regular, non-facilitated team meetings. These informal interactions provide space for decision-making, problem-solving, and conflict resolution without academic oversight. Independent collaboration has been shown to improve group functioning, communication, and accountability, especially when supported by shared planning tools and clear

team norms (Crosthwaite et al., 2006). Structured independence is essential for developing professional behaviours from the first year.

Digital collaboration is now central to project work; yet, many students enter university without the necessary skills to use platforms like Microsoft Teams effectively. While digital familiarity is often assumed, functional fluency is not a universal skill. Students frequently underutilise core features like shared documents, task boards, and asynchronous channels, which limits group coordination and increases the risk of miscommunication. Teaching these tools explicitly within the course structure is essential, not only to support project completion but to prepare students for future team-based work environments. Monitoring student engagement in large cohorts remains a significant challenge. Digital platforms offer data on access and activity, but this needs to be paired with intentional course design. Short reflective reports, attendance logs, and rotating roles within teams can all serve as indicators of participation, enabling early intervention.

Finally, a multi-level academic support structure is vital to ensure students know where and how to seek assistance. Many first-year students are reluctant to escalate issues, particularly in team settings where peer relationships are still in the development stage (Clausen et al., 2025). Clear communication channels, defined support roles, and peer mentoring structures all contribute to normalising help-seeking and addressing concerns before they escalate. Incorporating this layered support into the facilitation model ensures that academic input is accessible and proportionate to the student's needs.

Drawing from the literature, five key criteria were identified as essential for the successful facilitation of large, project-based courses in an online or blended environment. These criteria informed the development of a structured facilitation framework specifically designed for first-year engineering students. The framework ensures that both pedagogical intent and practical delivery are aligned to support student learning, engagement, and collaboration. The five criteria are as follows:

1. Facilitation sessions should be co-constructed by students and academics, with an emphasis on student agency.
2. Students must engage in independent, non-facilitated team meetings to foster accountability and peer-led development.
3. Explicit instruction in the use of digital tools (Microsoft Teams, LMS platforms) is necessary to ensure full functionality and equitable participation.
4. Academics need mechanisms to monitor student participation and identify disengaged or struggling team members early.
5. A multi-level support structure should be available to address student queries and challenges effectively.

In response to these needs, a facilitation framework was developed comprising five interrelated components. These include three core session-related stages: group formation, the facilitated session, and post-session pathways, along with two parallel elements: independent group meetings and structured digital tool integration. Each component is designed to ensure that both student and academic contributions are meaningfully integrated at each stage.

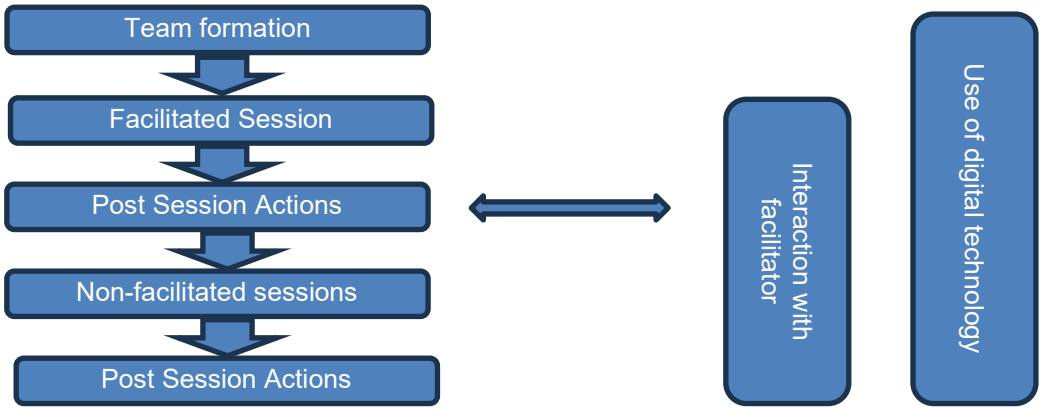

Figure 1: Facilitation framework

Implementation

The facilitation framework has been implemented in a first-year problem-solving course in Semester 2 of 2023 and in the renewed offering in Trimesters 1 and 3 of 2025. The cohorts consisted of approximately 100 students undertaking a range of majors, including construction and surveying. The course was delivered in a hybrid format, allowing students to study online or in person. Although the units had multiple learning outcomes, the overarching theme centred on guiding students through the engineering problem-solving process. Different formats for this were offered across the units; however, a consistent theme was stakeholder engagement and the iterative nature of engineering design. A significant focus was placed on researching potential solutions to engineering problems and generating (ideating) creative and viable responses.

In previous offerings of the courses, the teaching team had noted several recurring issues. These included difficulties in engaging online students with their group work, challenges in managing group dynamics and resolving conflicts, and a consistently high volume of individual student inquiries directed to the course coordinator. These concerns are also widely documented in the literature as common challenges in large, project-based courses and were key drivers in the development of the facilitation framework (Whisenhunt et al., 2019). As described in the figure above, the framework comprises five broad categories: Group formation**,** facilitated session**,** after-session action**,** digital technology**,** and non-facilitated group meeting. Each of these categories requires tailoring to the individual requirements of both the course and the teaching team. As there are near-endless variations in course design, cohort characteristics, and staff availability, the implementation notes below are intended not only as a case study of this course but also to raise critical considerations and questions for others adapting this model.

Group Formation

The framework is designed to begin with group formation. Although this step occurs only once, it has lasting consequences for student engagement and group effectiveness. Within this phase, four main sub-parts were considered: (1) how students would be placed into groups, (2) the size of each group, (3) when the groups would be formed, and (4) the scheduling of group sessions.

There are multiple methods for forming student groups. Given that this was a first-year course and recognising that many students may not yet have developed or practised their transferable skills in a group setting, the students were allowed to self-allocate into groups. This approach served two purposes. Firstly, it allowed students to exercise some autonomy in choosing their team members, further aiding their sense of belonging (Hills et al., 2023). Secondly, and more importantly, it enabled students to select a facilitation session time that suited their personal schedules. As a result, there was an expectation that students would attend most of their facilitation sessions. In instances where groups were not fully populated through self-selection, remaining students were randomly allocated.

Group size was also a critical factor during this stage. Groups that are too small may lack diversity of ideas and can overburden individuals, while overly large groups often suffer from disengagement and a lack of accountability. As such, groups consisted of six students. This number was chosen not only because it suited the scale of the assessment tasks, but also because it provided a buffer, allowing up to two students to withdraw without jeopardising the group’s function. Timing was another significant consideration. Ideally, groups should be formed as early in the semester as possible. However, given that the census date falls in Week 4, it was not feasible to lock in group allocations before this point. Finalisation of groups occurred over the weekend following the census date to ensure the process was both equitable and efficient. Although it was possible to delay finalisation until the middle of the following week, earlier confirmation was prioritised to enable student progress.

The timing of facilitation sessions also required careful planning. Given the fully online nature of the course, it was anticipated that students would have varied work and family responsibilities. A range of time slots, both during and outside regular working hours, was therefore made available.

However, this flexibility is heavily dependent on the goodwill and availability of academic staff, particularly when offering evening or after-hours sessions.

Facilitation sessions

The facilitation sessions are a core part of the framework, where students take the lead in self-paced meetings under the guidance of an academic. Several pedagogical decisions needed to be made when designing these sessions, including their starting point in the semester, duration, and whether they should be structured or unstructured. Due to the census date occurring in Week 4, only nine weeks remained for facilitation, one of which was dedicated to group presentations. This left eight weeks for students to develop a project and begin building their transferable skills. Given the limited time, it was essential to carefully consider what should be included in the facilitated sessions. These sessions needed to be driven primarily by students, creating a space where they could feel supported and safe to ask questions. This intention ruled out highly structured requirements, such as formal meeting minutes, which are typically part of group work expectations. As a result, the skill of documenting team meetings had to be developed outside the facilitation sessions.

This requirement encouraged groups to meet not only during the facilitated sessions but also outside of them, in more formal non-facilitated meetings. These ‘extra’ sessions complemented the facilitated sessions. They allowed students to have open, informal conversations about the task at hand without academics present, while still bringing their questions and concerns to the facilitated session for discussion. As the structure now required two group meetings per week, the facilitated session duration was set to 30 minutes. This decision ensured that sessions could fit comfortably within the overall course structure and avoided periods of downtime that were unproductive. Given the limited session duration, it was essential to have both a clear plan and an overarching strategy for conducting the sessions that encouraged both student- and academic-led discussions. The academic-led component needed to be concise and focused on key updates and course-wide information. As such, the sessions were designed and implemented using the following format: the facilitator updates, the facilitator checks in with the group (including addressing group issues and individual concerns), a student-led discussion, a summary of key tasks, and establishing a pathway forward.

Each section of the session was adaptive and not bound by strict timing. The academic would begin with course-related announcements and then move into a structured check-in. Typical guiding questions included: “Are there any issues you’d like to raise?”, “How is the assessment progressing?”, “How is your group functioning this week?”, and “Did your non-facilitated session go smoothly?” These prompts encouraged students to raise concerns related to the course, assessment, or group collaboration. In most cases, this would lead to an extended student-led discussion. If student engagement was limited, the academic was prepared with a list of topics to reinvigorate the conversation. These topics often began with a recap of recent course content or assessment requirements.

Each session concluded by setting a clear direction for the week ahead. For students, this involved identifying tasks to complete and organising their next non-facilitated meeting. For academics, it included documenting action items from the session and preparing responses to unresolved student questions. This session structure created a sustainable rhythm and helped reinforce consistent expectations for participation and progress.

Follow-up session action

The follow-up session primarily focuses on what the group should undertake during the upcoming week, and for the academic to follow up on the requests. For students, some of the typical tasks that should be completed include non-group facilitated meetings, meeting documentation, and assessment tasks. For the academic setting, the issue with online group facilitation is tracking participating students and problem-solving proactively, rather than retroactively. As such, the follow-up facilitation sessions are the most important section of this framework for the academic.

In the early stages of group formation and meetings, it is crucial to ensure that all group members are actively participating. After each meeting, it is important to track the students' contributions. In most cases, students are effectively communicating as active members of the group. In the other cases, some students might not be engaging with the course at all, not just the group section. Careful tracking of students should be undertaken, and it is important that this process is efficient and precise. The university's LMS allowed the group members to be uploaded across both Microsoft Teams and the LMS. This allowed the groups to appear separately within these platforms and facilitated a faster way to track progress during the group checkup. Using the LMS, it was possible to note when the student last engaged with the course. During the facilitation sessions, students would ask academics questions about how to complete the assessment effectively. As such, it was expected that most of the students' ability to assign tasks and complete tasks related to the assessment would be developed after this meeting.

Digital technology

There are two distinct elements to the use of digital technology in this framework. The first relates to the platform used for group sessions, file sharing, and communication. The second involves the suite of tools required for students to complete assessment tasks and engage in ideation and collaboration. For this implementation, Microsoft Teams was selected as the primary digital platform. This decision was based on its recent integration with the university's Learning Management System (LMS), which allowed for seamless transfer of group data, simplified tracking, and centralised communication. Despite the documented tendency for students to prefer alternative platforms such as WhatsApp, Discord, or Slack, Microsoft Teams was considered more appropriate due to its institutional alignment, data security, and administrative oversight. All students had institutional accounts, eliminating the need for third-party logins and reducing potential risks associated with privacy and data breaches.

Microsoft Teams enabled the creation of individual group channels under the relevant facilitator. It also functioned as a file-sharing platform, where students could collaboratively work on documents that were visible to academics. This transparency supported monitoring and helped identify whether progress was being made. However, this level of visibility required a strong agreement between students and facilitators around access and oversight. Academics were granted read-only access, and group members were encouraged to adopt transparent working practices. One challenge noted was the potential for students to misuse Teams' administrative features. If full permissions were granted, students could delete files, remove members, or alter conversations. To mitigate this, students received explicit instruction on the ethical and appropriate use of the platform. A team charter activity was introduced early in the project to support group norms and promote professional behaviour.

Beyond Microsoft Teams, other digital tools were used to support specific components of the course. While Teams supported document collaboration, the course required students to engage in creative ideation as part of the engineering design process. Two additional tools were introduced to support this: generative artificial intelligence (GenAI) tools and Padlet. GenAI tools were recommended for individual ideation and exploration, particularly for students who may not have been exposed to creative processes in design or problem-solving (Nikolic et al., 2025). Although the use of GenAI in formal assessment was prohibited, students were encouraged to use these platforms to explore ideas and perspectives before contributing to group discussions. This was particularly valuable in first-year settings, where many students are still developing foundational skills in generating and evaluating solutions (Quince & Nikolic, 2025; Quince et al., 2024).

During group ideation sessions, students required a digital tool that enabled the real-time capture of ideas in a format that could be submitted as part of their assessment. Padlet was selected for this purpose due to its user-friendly interface and collaborative functionality. It allowed students to organise and present ideas using mixed media formats, including text, images, video, and links. Padlet's layout options also support different types of brainstorming activities, making it a versatile tool for documenting the early phases of problem-solving. Other tools were also explored, including Microsoft Forms for weekly planning and feedback, as well as task-tracking tools to support project

management within each group. These supplementary tools were optional but encouraged, especially for groups that needed additional structure to manage their progress.

Non-facilitated group meeting

The non-facilitated group meetings were designed to operate in parallel with the facilitated sessions. Their inclusion was based on the decision that facilitated sessions would not follow a highly formal structure, despite formal meeting documentation being a requirement in the group assessment. The non-facilitated meetings, therefore, served two purposes. Firstly, these meetings provided a space for students to collect and refine group questions, thoughts, and ideas before engaging with their academic facilitator. This ensured that students used their time with facilitators more efficiently and entered those sessions with a clear agenda. Secondly, the non-facilitated meetings served as the formal meeting space required for assessment purposes. These meetings allowed students to fulfil the project's requirement for structured documentation, such as meeting minutes, agreed actions, and reflections on group dynamics. Because the facilitated sessions were intentionally informal and designed to be flexible, the non-facilitated sessions became critical for developing professional skills, such as documentation, role delegation, and communication protocols. This structure also encouraged students to take responsibility for their team's internal organisation and assessment progress.

In practice, these sessions varied in frequency and quality depending on the group. However, most students treated them seriously once they understood their dual purpose. Many groups scheduled them directly before or after the facilitated sessions for convenience, while others chose separate times that better suited their availability. Students were encouraged to use shared platforms, such as Microsoft Teams, to store documentation and track attendance, allowing facilitators to monitor progress without needing to be directly involved.

Educators perspective

Educator 1

The implementation of the proposed framework for facilitating online project groups worked very well. The five-component model supported seamless facilitation between the overall cohort and the individual project groups. Group formation remained a challenge due to the short timeframe available and the reliance on students to self-enrol when prompted. This remains a persistent challenge across higher education.

Groups that were manually formed by academic staff initially displayed a slight disconnect. In some cases, it took several weeks for these groups to establish a strong dynamic. Matching students based on their skills, prior experience, and desired learning outcomes is a complex process, particularly in first-year cohorts where these factors are still developing. This complexity is compounded by students' personal circumstances, which may change throughout the teaching period. Further investigation is needed to determine a more effective process for group formation in first-year online contexts.

The facilitation sessions themselves exceeded expectations. The structure enabled academics to manage groups more effectively than in previous offerings. The improvements in tracking student activity and using structured meetings helped avoid many of the earlier difficulties. Although the non-facilitated sessions lacked formal structure, this worked in the group's favour. It allowed students to maximise the usefulness of those sessions and encouraged more meaningful interactions. The approach also helped build stronger professional relationships between facilitators and students. Occasionally, groups veered off task during facilitated sessions; however, the 30-minute duration proved to be appropriate. No sessions felt too short, and the time frame supported productive discussions without unnecessary filler. The non-facilitated sessions were generally successful, though they were not always as open or student led as intended. The reasons behind this are unclear and should be explored further to improve future offerings.

The after-session action phase functioned largely as intended. However, there were occasional issues with students missing sessions. In some cases, this led to confusion when recordings failed or questions went unanswered during the live session. These issues were more prominent during peak workload periods. One way to address this may be to reduce the number of groups assigned to each facilitator, which would allow for quicker responses and less administrative strain. The use of Microsoft Teams was comparable to other digital platforms in terms of functionality, but its integration with the LMS made a significant difference. The ease of moving group data between systems improved administrative efficiency. The file-sharing function within Teams was particularly valuable. It enabled group members to collaborate on documents using Office applications without relying on external links or shared Google Docs. This approach also reduced reliance on email, streamlining communication and version control.

Educator 2

This perspective comes from being a casual marker assisting academic staff in a course with a large cohort of predominantly first-year engineering students. These students, coming directly from secondary school or balancing work and study, often require additional support to adapt to the demands of tertiary education. The online facilitated group sessions provided significant benefits, enabling facilitators to model good meeting practices, guide task completion, and improve the overall quality of assessment submissions. Weekly facilitation addressed issues like non-attendance, incomplete tasks, and uncertainty about project requirements, resulting in better-managed projects and higher-quality submissions.

Facilitated sessions also allowed students to practice public speaking through regular updates, enhancing their presentation skills for assessments. These pracAtices gave students the confidence to summarise their research findings effectively, an important skill for their live presentations. Requiring cameras during MS Teams meetings helped foster group dynamics and networking skills, which could aid students in their studies and future careers. Watching relationships develop within the groups highlighted how students could leverage each other's skills for better collaboration. Such interactions also provided a direct point of contact with academic staff, contributing to a more personalised learning experience.

Using MS Teams offered practical benefits, such as integrated file sharing and the ability to work collaboratively while mirroring real-world engineering workflows. Students utilised templates for agendas and meeting minutes, learning essential organisational skills that are highly valued in engineering and management professions. The setup allowed them to use dual monitors where one for the meeting and the other for accessing shared project files making online collaboration efficient and reflective of teamwork practices in the workforce. Additionally, online sessions catered to diverse student needs, including disabilities or temporary illnesses, ensuring inclusivity. Features like live captions and audio controls particularly benefited students with hearing impairments or other challenges.

For academic staff, facilitation allowed casual markers to gradually integrate into teaching teams, observing workshops, managing small group discussions, and collaboratively enhancing course content. This approach not only supported better course delivery but also fostered professional growth for emerging educators. The opportunity to deliver workshop content in subsequent semesters was made possible through the experience gained in facilitating online groups.

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