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Blending Modalities, Pedagogies, and Technologies: Redesigning an Information Systems Course to Encourage Engagement

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Blending Modalities, Pedagogies, and Technologies: Redesigning an Information Systems Course to Encourage Engagement

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Abstract:

Having realized that the traditional approach to teaching our IS course on Business and Systems Analysis was not engaging students enough, we decided we needed to redesign our learning environment. The goal was to develop a course that encourages student participation, allows them to practice the different techniques we introduce them to, and empowers students to take control of their learning. To achieve this, we blended modalities (online and in-person), pedagogies (constructivist and collaborative approaches), and technologies (student-centered technologies). This resulted in a redesign that included replacing the lecture with learning resources of a digestible size and an activity-based discussion, the workshop focusing on a project for authentic problems, sense-making via doing and reflection, hybrid participation in a steady and sustainable pace, and learning communities to enable more interaction. In this paper, we share our experience and lessons that we have learned through a journey toward a student-centered approach to learning.

Keywords: Teaching and Learning, Blended Learning, Collaborative Learning, Technology and Learning, Information Systems Education.

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1 Introduction

There is growing interest in blended learning (Rasheed et al., 2020). The booming trend can be attributed to the advancement of technologies that transforms the learning experience, such as metaverses (Diaz et al., 2020) and intelligent agents (Wu et al., 2021), learners' desires for flexibility, and constraints imposed by the environments (e.g., the pandemic lockdown). Learners are exposed to a multiplicity of interactions, including face-to-face, online, synchronous, and asynchronous modes, and have opportunities to adjust their learning pace and learning strategies corresponding to their learning styles. Empirical studies show enhanced learning outcomes (Vallée et al., 2020) and positive evaluation of blended learning (Dziuban et al., 2018) as compared to traditional face-to-face learning. Blended learning also shows potential for classes at different scales where diverse learning needs can be fulfilled (Castro, 2019). Despite the potential of bringing together the best of traditional face-to-face learning and online learning, research highlights challenges in blended learning, ranging from a lack of self-regulation (e.g., procrastination and poor time management), to technological factors (e.g., resistance to technologies and technostress), to social factors (e.g., the feeling of alienation and isolation) (Rasheed et al., 2020). A lack of engagement and its associated negative learning outcomes remain a thorny issue.

An inadequate learning experience calls for a more sophisticated design of blended learning. It is important to first acknowledge the multifaced nature of the concept (Picciano et al., 2014). Blended learning is loosely defined as "the thoughtful integration of face-to-face and online instruction" (Halverson & Graham, 2019, p.146) and constitutes three components. Modality (face-to-face and online) is the most common component. Many universities have offered blended learning in such a dual delivery mode. Students can choose to come to an in-person class or watch a live broadcast (e.g., Arizona State University Sync). The second component asks instructors to consider using blended technologies (Picciano et al., 2014). For example, quiz chatbots and self-regulated learning chatbots were bundled with Moodle learning management systems to help students absorb content and set learning goals respectively (Hew et al., 2021). A mix of pedagogical methods is the third component of blended learning (Driscoll, 2002; Picciano et al., 2014). For example, research demonstrates that a combination of learning from textbook materials, live cases, and participation in simulated scenarios improves critical thinking and problem-solving activities (Turk et al., 2019). Three components are intertwined and should be tailored to suit particular learning development contexts (Picciano et al., 2014).

In this study, we describe the process of designing a first-year undergraduate course on business and system analysis with 200 students on average by demonstrating how we make the most of blended learning with consideration of all three components. We draw on the constructivist and the collaborative approaches (see more discussion in the next section) to guide our design, aiming to engage and empower students in learning. Our study contributes to knowledge and practices that support blended student-centered learning. We reveal practices that focus on authentic problems (constructive approach), learning resources tailored to problems in a digestible size (constructive approach), sense-making via doing and reflection (constructive approach), and hybrid participation in a steady and sustainable pace supported by a learning community (collaborative approach). Underpinning these practices are blended student-centered technologies instead of teacher-centered technologies.

The paper is structured as followed. First, we provide an overview of the different approaches used in blended learning, including the traditional approach, the constructivist approach, and the collaborative approach. We then present the learning environment, explain the delivery structure, the technology used, how students interact and collaborate, and the learning outputs from participating in the class. We discuss what motivated the redesign away from a teacher-centered approach. After that, we show how we have redesigned a course blending constructivist and collaborative approaches and then present a week in the life of the course to give a real-world example of how students might participate in a redesigned course, going from the learning resources to contributing to the activity-based discussion, to participating in the project-based workshop. This is followed by the lessons we learned on this journey and the concluding remarks.

2 Approaches to Learning

There are a number of approaches to learning, such as the traditional approach, the constructivist approach, and the collaborative approach (Leidner & Jarvenpaa, 1995; Moallem, 2001; Neville et al., 2005). However, the learning environments of educational institutions have seen little change in the past

30 years, where there is still a lack of engagement of students in the learning process and a reliance on the traditional approach of teaching (Hustad & Olsen, 2014; Kane & Fichman, 2009; Zhang, 2012). Here, the traditional approach is teacher-centered, where it's believed that there is an objective reality with knowledge existing outside the mind of individuals (Moallem, 2001). The goal is then to transfer this knowledge from the instructor, who is supposed to possess it, to the learner, who is supposed to lack it (Leidner & Jarvenpaa, 1995).

In contrast to this approach, the constructivist approach and the collaborative approach are learner-centered, where knowledge is constructed by the learners through discovering the world themselves (Kane & Fichman, 2009; Kirschner, 2001; Wiener, 1986). It is suggested that an external reality does not exist outside an individual's mind (Karagiorgi & Symeou, 2005; Leidner & Jarvenpaa, 1995). Instead, each learner's experiences and biases are different, as they form their own opinions on what is going on around them (Wurst et al., 2008). With this model, it is believed that students learn better when they have to discover for themselves by interacting with objects themselves, rather than being told (Leidner & Jarvenpaa, 1995; Wurst et al., 2008). The teacher serves more as a mediator and provides support for students during class to help learners construct their own views of reality (Leidner & Jarvenpaa, 1995) by scaffolding student thinking to sustain ongoing engagement.

The collaborative approach is a derivative of the constructivist approach, where the main difference between the two models is that constructivist learning is assumed to occur at the individual level as they interact with objects, whereas collaborative learning emerges through interactions between individuals (Slavin, 1990). Therefore, learning can be seen as occurring when individuals exercise, verify, solidify, and improve their mental models through discussions and information sharing (Alavi, 1994; Leidner & Jarvenpaa, 1995). There are four different levels where the learning can occur, including the individual level, assigned group level, class group level, and/or discipline community group level (Doyle et al., 2016). For example, at the individual and class group levels, instructors can build rapport by providing personalized support and feedback (Dick, 2021). Online learning communities stimulate communication, and increase online closeness and presence (Rasheed et al., 2020). Similar to the constructivist approach, the collaborative approach aims to foster autonomy and ownership of learning by enabling students to choose what to learn and how to learn (Ashworth et al., 2004).

Alavi (1994) suggests that actively engaging learners in the learning process is preferred over the traditional method of teaching, where it generates more critical thinking, creative responses, and high-level reasoning strategies, among the learners (Hustad & Olsen, 2014; Leidner & Jarvenpaa, 1995; Zhang, 2012). However, it is often found that when technology is being used in educational learning environments, it is in an automated fashion as opposed to a transforming one, wherein "the absence of fundamental changes to the teaching and learning process, such classrooms may do little but speed up ineffective processes and methods of teaching" (Leidner & Jarvenpaa, 1995, p.265). That is to say, rather than trying to use technology to transform learning environments, they are merely being used to aid the traditional method of teaching.

For example, technology has been used to enhance the current traditional method of teaching, where a blog was used as a tool to allow learners to communicate with the instructor through learners leaving comments on a blog post that contains the course slides, where they could ask questions about particular content in the slides. Technology is also used as a Q&A tool, where learners can ask questions during class, and during/at the end of class, the instructor answers the questions that were asked. However, in these instances, technology is only being used to enhance traditional methods of teaching.

In this paper, we consider a redesign that was undertaken, where we moved from the traditional approach (as-was) to an approach that integrates constructivist and collaborative elements (as-is) where we blend technologies to involve the learner more in the learning process. A comparison between these two designs is presented next from several perspectives, including the delivery structure, the technology used, how the students collaborate, and the learning outputs.

3 From Our Traditional to Student-centered Learning Environment

This is a mandatory course for first-year students who are interested in or pursuing an information systems (IS) major. Students are expected to learn how to identify and define problems, elicit user needs, model information systems contexts, propose IS-enabled solutions, assess their desirability and feasibility, and document requirements. We used four perspectives to both understand and explain our as-was learning environment and to help redesign our current as-is learning environment. First was the delivery

structure, where we consider how the course was set up, ranging from lectures, workshops, and assessments, and how these were related to each other. Second was technology, where we identify the technology in use in the learning environments and how we use it to enable interactions between all stakeholders (lecturers, tutors, and students). Third was interaction and collaboration, which focuses on tasks and activities set up for how the stakeholders interact with each other across the learning environments and opportunities they have to collaborate with individuals and groups and then with the wider class group. Fourth was learning outputs, which consider how learning performance was evaluated from projects to exams. In the following sections, we describe both learning environments through this lens and motivate the need for the redesign.

3.1 Our As-Was Learning Environment

3.1.1 Delivery Structure

The original course structure followed a traditional approach. That is, it was made up of weekly readings, lectures, workshops, an individual project, and an exam. Students were expected to complete the readings before the class. In terms of the lectures, they were held weekly in a two-hour slot in a lecture theatre, where the lecturers delivered content for this duration. Further, these were recorded to cater to any students who could not attend for legitimate reasons (e.g., unwell at the time). They also worked with a class case and used this to provide examples for the students. This was a teacher-centered approach where students listened to the lecturer, took notes, and asked questions if they wanted.

Students then attended weekly workshops, which were fifty minutes in duration and consisted of the tutors recapping some of the content of the previous week's lecture. After this, some form of activity would be completed individually by students on a workshop case (e.g., developing an information-gathering plan for the case). The tutors would go around the class and help students complete the activity and answer any questions they had.

Students were then expected to apply this learning to their project. The project was split into five parts (1. Problem Determination – information gathering and analysis; 2. Problem Analysis – Information modeling; 3. Problem Analysis – Value-added analysis; 4. Solution Formulation – Requirements; and 5. Solution Formulation- Prototyping) where each part builds on the other and was based on a project case. For example, students had to first identify a problem in the case by applying root-cause analysis techniques and modeling the as-is situation using information modeling techniques. They then had to create a solution vision, write functional and non-functional requirements, conduct use case modeling, and prototype a solution.

Lastly, the students had a three-hour exam that tested them on the same learning on an exam case. Students had access to the case before the exam so they could familiarise themselves with the content. They then had to go through the same process as their project, completing activities such as problem identification, value-added analysis, requirements, use case modeling, and feasibility analysis.

3.1.2 Technology

To support the delivery structure above, a traditional suite of technology was used, with the addition of some interactive applications. This included Blackboard as the learning management system (LMS) where students accessed learning materials, completed quizzes, and submitted assignments. General announcements were also made to the class through here, and while a discussion forum was also set up for students to ask questions, they preferred Facebook as a channel for peer discussion (this involved the tutors and other students but not the lecturers).

Lectures were delivered face-to-face in a lecture theatre, where a projector was used to show slides (these slides were made available before class so they could be downloaded). GoSoapBox (https://www.gosoapbox.com/) was also used to encourage student interactions. This consisted of questions that the students answered through their devices (laptops, tablets, or phones) and showed a percentage breakdown of how students answered the questions providing the lecture with another learning opportunity.

In the workshops, students had access to a lab that was made up of pods of computers. The tutors taught the content on projectors and students would then work on their individual computers to complete the activity that was set. They were not required to submit this work anywhere.

3.1.3 Interaction and Collaboration

Given an average class of 200 students, there was limited collaboration between students and limited interaction between students and lecturers. In the lectures, the lecturer delivered a two-hour lecture, with students being passive participants except for the times when they used GoSoapBox to answer pre-prepared questions from the lecturer (which was interaction as opposed to collaboration with others). They could also raise their hand to ask a question. The interaction was usually limited to a small group of students who were brave enough to speak in front of a crowd.

There was a bit more interaction and collaboration in the weekly workshops, which were capped at 30 students per workshop. Students interacted with tutors by asking questions about activities and assignments. They also collaborated with other students sometimes when the activities had them working in a group.

3.1.4 Learning Outputs

Aligned withto the teacher-centered approach, the teacher defined the boundary of learning tasks, outputs, and how learning performance should be evaluated. Students were assessed by their performance on workshop assignments, the individual project, and a final exam, all based on multiple fictitious business cases (one for each assessment). Students were expected to produce learning artefacts, such as problem statements, context diagrams, information flows, vision statements, requirements statements, use case modeling, and prototypes. For each artefact, students had opportunities to practice multiple times (e.g., first seeing the lecturers' effort, then in their workshop, followed by their project, and finally again in the exam). Formal feedback was provided for each submission.

3.2 Motivation for the Redesign

After implementing the teacher-centered approach for several years, we observed diverse student pains and needs. Many of them are long-standing issues related to motivation. However, the volatile socioeconomic environment aggravates the situation. Students have to juggle work, life, and study due to rising living costs (O'Connor, 2022) and social and political disruptions (e.g., COVID-19). Moreover, the changing landscape of work (Mātauranga Kōrero, 2019) demands students be equipped with relevant competence to compete in the job market. We wondered how we could improve the student learning experience and outcomes and asked ourselves some bigger design questions.

Students focus a lot on the grades of each individual assessment. In their pursuit to collect "points", students are afraid of making mistakes when undertaking eight workshop assignments, an individual project, and the final exam. How might we rekindle student learning interest and help students refocus on learning itself?

The delivery mode and the pace of learning are controlled by lecturers. Students need to attend in-person lectures and complete assignments at the prescribed time. Learning can become transient as students strive to achieve short-term goals (e.g., cramming to complete the workshop assignments). Once the task is removed, students do not look back on it until the final exam. They are confined to a workflow set up by lecturers and thus perceive limited autonomy. The nature of the problems (pseudo-business cases) further diminishes student autonomy. Students attempt their solutions to approximate the lecturer's expectations as they assume there is a "right" solution. These business cases may help them apply knowledge and practice techniques, but may not be meaningful and valuable to students personally. This leads to a design question: How might we give students autonomy in their learning journey?

Related to the rigid delivery mode and learning pace, the teacher-centered structure disadvantages students who have extracurricular, familial, or cultural commitments. Students fall behind when workload surges or unexpected events occur. How might we create a learning space that considers diverse students' interests and circumstances?

The two-way interactions between students and the teaching team are limited to lectures and workshops. Moreover, in a large-sized class, fewer students have opportunities to express their views. How might we improve interactions and enable students to share their viewpoints?

Teacher-centered technologies dominate the learning environments. Learning management systems are mainly utilized for teaching management and content delivery. The use of technologies in class, while

aiming to engage students, is sporadic and does not provide continuity of the discussion. How might we bring student-centered technologies to the forefront and make better use of technologies?

3.3 Our As-Is Learning Environment

3.3.1 Delivery Structure

When redesigning the delivery structure, we wanted to adopt a more student-centered approach that brought students into the learning process through participating in activities and taking responsibility for their learning. It was made up of weekly readings, concept-based videos, activity-based discussions, and project-focused workshops, with the assignments now consisting of sketchbooks and an individual project.

The first was to create concept-based videos on business and systems analysis topics and techniques, covering problem determination, problem analysis, IS-enabled solution formulation, and IS-enabled solution validation. The concept-based videos focused on topics that students needed to understand (e.g., what is an information gathering plan) and an explanation of techniques that business analysts (BAs) need to do their analysis and how to do them (e.g., creating an interview guide to gather information from stakeholders). Some of the videos also contained an activity for students to complete (e.g., using the wisdom of the class to create a list of potential interview questions that could be used to gather information for their project). Some of the goals we set for these were: releasing 3 – 5 videos each week; for each one to be under 10 minutes (although this was not always possible); and involving students in more than just watching them by adding activities for them to complete. The concept-based videos were released a week before each class, along with a reading list, giving students time to consume them and complete any activities that were necessary.

The second was to challenge what could be done in the lecture theatre. This resulted in what we call activity-based discussions, which were divided into two parts. The first part consists of the lecturer setting an activity based on one of that week's concept-based videos. For example, one of the videos explained the technique of brainstorming, and then that week's activity-based discussion was a brainstorming among the students in the class. This meant that rather than the lecturer delivering the content, students were involved in the activity that was set and the lecturer acted as the facilitator. These were fifty minutes in duration.

The second part of the activity-based discussion served as a gateway to the project-based workshops. Here students had to complete their sketchbook, which is a space for them to think about the different elements of their project. They expressed their thoughts in diverse ways, including the use of text, pictures, and drawings. We provided communication freedom so that students are more likely to demonstrate their evolving mental models. Generally, we asked three questions related to the topic they were going to focus on in their next workshop and allowed them to prepare for it. The first question looked for confirmation that they understood the topic; the second question asked them what techniques they might use in the next part of their project, how they would apply them, and why; the third one asked students to consider the activity they would undertake in their next project-based workshop.

For example, as shown in Figure 1, in the define phase of business analysis, we first asked students to think about why this phase is important and relate what they learned to their life experience (e.g., Have you done something similar? Explain the situation if you have, or if not, was there a time where it would have been helpful to define the problem, but you didn't?), and how do you complete this phase? The second question encouraged students to consider a range of problem-determination techniques introduced (e.g., causal mapping, five whys, fishbone, and affinity mapping) and discuss their plan of execution for their project. The last question required them to identify a problem that they would use in their project-based workshop to develop a causal map.

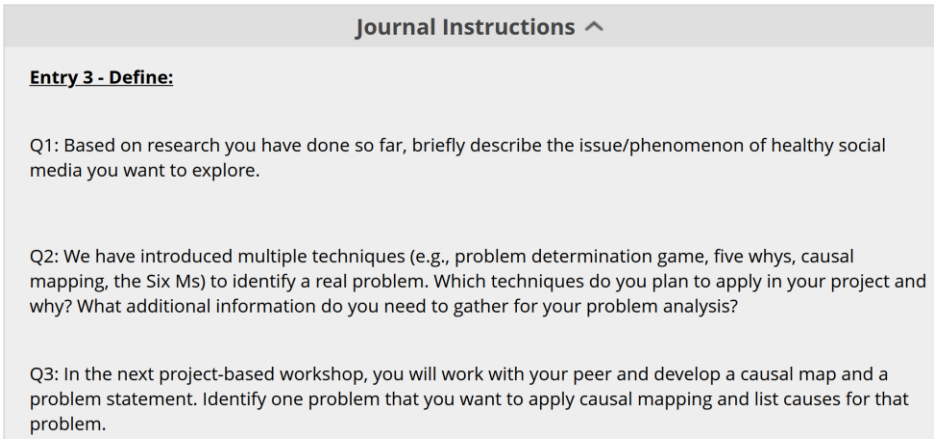

Figure 1. Questions for Students in Sketchbook 3

Finally, we redesigned the workshops from topic-centric to project-centric, which we refer to as project-based workshops. These were broken into sharply timed activities, where students used the fifty minutes to work on their project. For example, as part of their project exploring ways to make social media more healthy, students had to conduct interviews with other students, who are also social media users, to empathize with them and help identify a problem worth looking at. Here, the project-based workshop was broken down into working pairs, they had 10 minutes to confirm their interview script and then spent ten minutes interviewing two other students before switching to be interviewed themselves. This allowed them to apply the technique of interviewing introduced in the previous week's concept-based videos and activity-based discussion. Further, they could use the information that was generated by the whole class to inform the work they were doing (e.g., after using the wisdom of the class to generate potential interview questions, they could use these to create their own interview guide (or adapt them to be more suited)).

3.3.2 Technology

The university provided Panopto to record the concept-based videos. This integrated with Blackboard (which was still used as the class LMS) so it now contained: the reading list, the concept-based videos, and the place where students had to submit their assignments, including their sketchbooks. It was also still used to make announcements. We then enabled the activity-based discussions and project-based workshops to be a hybrid format which Zoom allowed us to do. This meant students could attend either by logging into Zoom and participating or coming in face-to-face.

To encourage more interactions among students, tutors, and lecturers we decided to adopt MS Teams into the learning environment, which was used in multiple ways. An MS Team was set up for the course where a channel was created for each week's Kōwae (module) as shown in Figure 2. For any activities that were released in the concept-based videos, the lecturer would create a new conversation in that week's Kōwae titled with the name of the activity and add the instructions. Students could then add their responses and respond to other students' responses (this was observed by both referring to another student's work and using the emojis to react to answers that were provided).

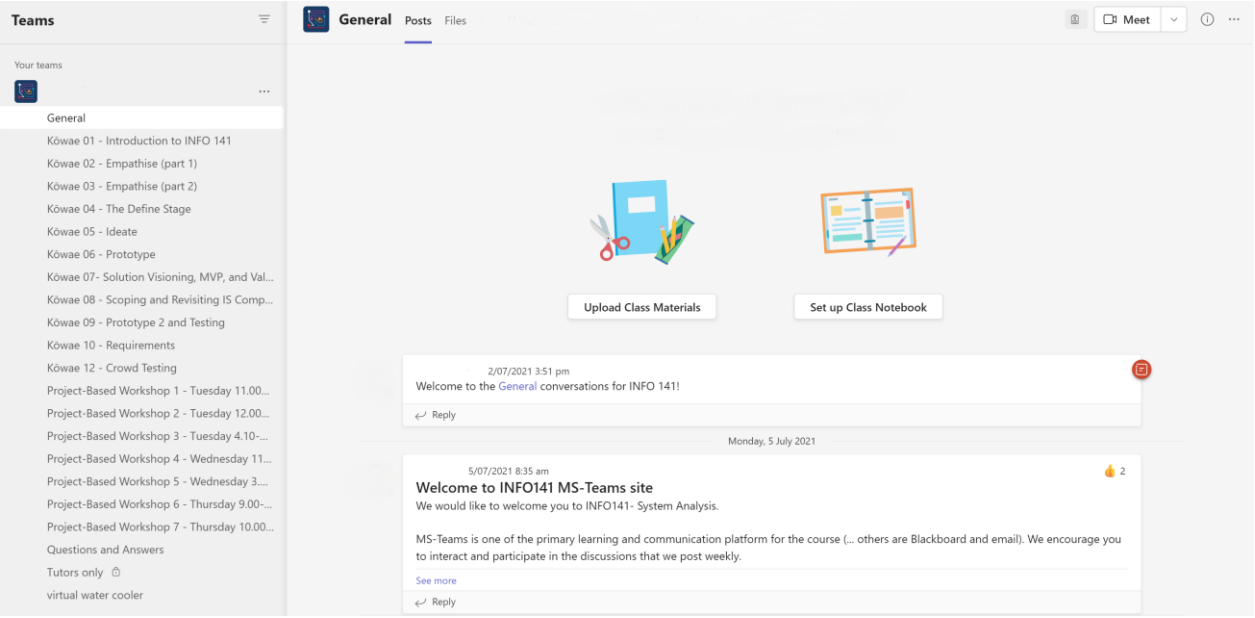

Figure 2. The MS-Team with Each Channel that was Setup

MS Teams was also used to structure the first half of the activity-based discussions where similar to Figure 2 above a new conversation was created in that week's Kōwae channel and in real-time students would complete the task that was set for them. This was shown on the projectors and allowed students to participate from anywhere they wanted (i.e., they didn't have to be in the class). Students who missed the synchronous session of the activity-based discussion could join the discussion asynchronously.

Channels were also created for each of the weekly project-based workshops. Then, a conversation was added for each activity that students would participate in. This often provided students with a workbook for them to complete (in the form of a PowerPoint deck) and, at the end, students were expected to upload their completed workbook. Students were allowed to view the work of other students in their workshop, as well as in other workshops.

3.3.3 Interaction and Collaboration

The redesign of the delivery structure was enabled by the different technologies that helped change student interaction and collaboration. Using the different levels that can be enabled in a collaborative learning environment consisting of individuals, assigned groups, and a class group (Doyle et al., 2016). While the readings and watching of the concept-based videos remained an individual experience, the activities they completed from these became a collaborative effort. That is, the wisdom of the class principle (building on the wisdom of the crowd: https://en.wikipedia.org/wiki/Wisdom_of_the_crowd) was applied where students were expected to share their responses on MS Teams and react to other students' responses. They were also encouraged to build on responses that their peers provided and the lecturers and tutors could interact with the students by responding and/or reacting to their work.

This also provided the foundation for the first half of the activity-based discussions, where the responses the students provided were often used as the foundation for the activity to be completed. Here, students participated in the class group, building on the knowledge they had created previously to start their activity and again using the wisdom of the class. The collective effort helped build a pool of knowledge on the particular area that the class was focusing on. During these sessions, it was observed that students not only reacted to other students' work with emojis but also built on the responses that were provided. The pool of knowledge that was created could then be used by students to prepare for the project-based workshops and then applied to the project overall.

In the project-based workshops, they worked in temporarily assigned groups and the class group. In terms of the assigned groups, students would create their groups to be able to complete the task. This involved discussion-based activities related to their individual project but then they were required to share the knowledge they generated on MS Teams as part of the class group. This allowed others in the workshop to see what their peers had done (they could even use this knowledge by adapting it for their own work).

Special types of channels were also set up for interactions outside the class. This included a Q&A channel, where students could pose questions or seek feedback on their work. This platform allows lecturers, tutors or, as observed, even fellow students to provide responses, as illustrated in Figure 3. There was also a virtual water cooler channel that was used to introduce the lecturers, the tutors, and the students, and generally used for informal interactions.

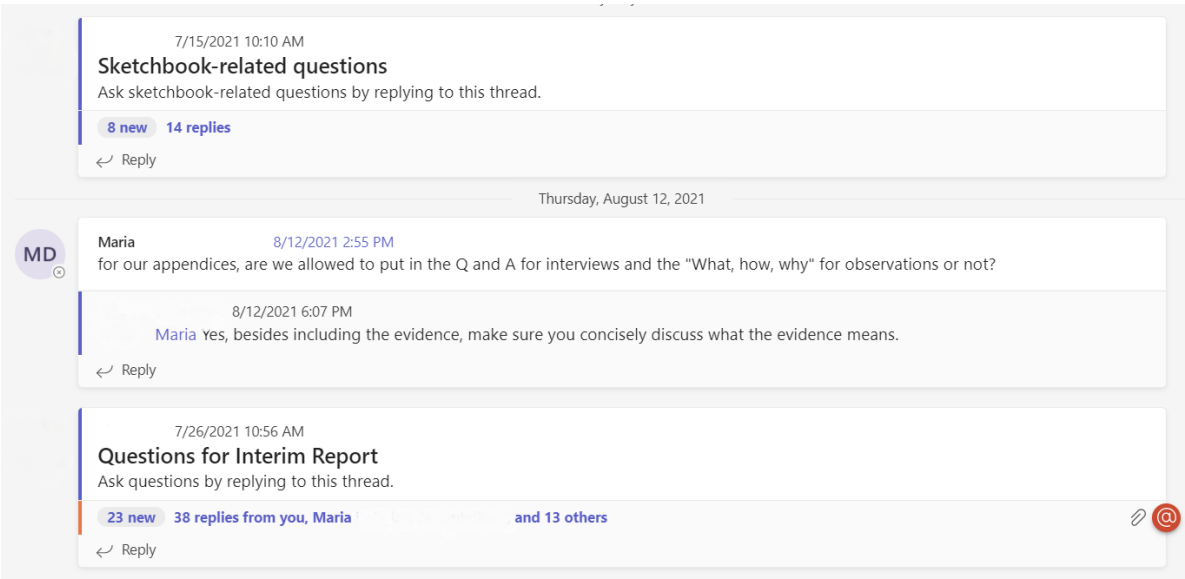

Figure 3. Student Q&A Channel on MS Teams

3.3.4 Learning Outputs

In the student-centered approach, students have been given more autonomy in their learning outputs. There is now only one project for the course, where the lecturers set a design challenge for them to complete (e.g., we asked students to tackle a design challenge about "how might we improve the learning experience of university students?"). Students can then explore and scope their own project by deciding which techniques to apply to gathering and analyzing information to help define a problem and prototype a solution for the design challenge.

Activities done in each learning session contribute to class artefacts (i.e., problem representation, solution, and evidence of value discovery and delivery). Students receive informal feedback from peers, tutors, and instructors in every learning session and use it to improve their artefacts. Students can observe learning outputs created by peer students and feedback offered for those learning outputs. Learning outputs alongside feedback are a shared experience between the teaching team and the students and between the students themselves.

4 A Week in the Life of Our Students

To provide more context to the redesigned learning environment discussed above, the following section provides a typical week for a student. In this particular class, the students have been set the design challenge of "How might we make social media healthy?" We will focus on week 2 of the class, which has the theme of "Empathize".

4.1 Completing the Learning Resources

A week before the activity-based discussion, the lecturers release the learning resources for week 2. This consists of a reading list that students must complete and four videos focusing on the topics of empathizing and stakeholders and the techniques of interviews and observations (along with the slides for these videos). Presented in Figure 4 is a view of what the students see on Blackboard.

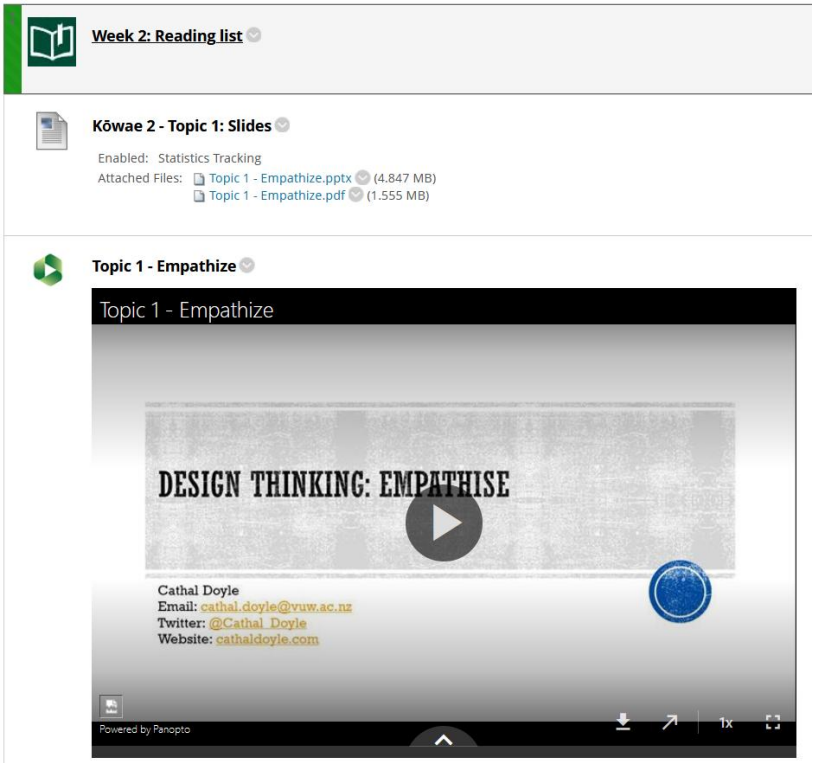

Figure 4. View of the Learning Resources on Blackboard

There are two activities for the students to complete from these videos. After watching the video on interviews, they must participate in a class brainstorm to identify potential questions that they would like to ask interviewees in their empathize phase. This can be completed, and added to, up until the morning of the activity-based discussion. Presented in Figure 5 is the conversation that was posted in MS Teams and the responses that students provided. Overall, there were 15 responses provided with numerous questions posed in each of those responses.

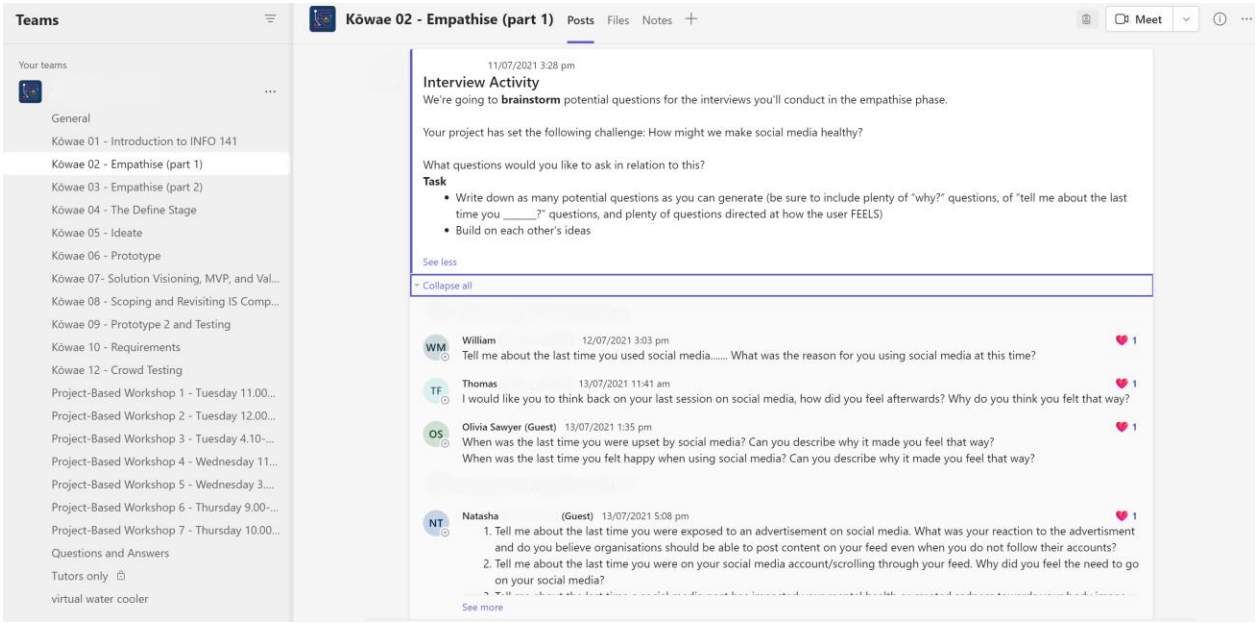

Figure 5. View of the Activity Conversation on MS Teams and Responses from Students

The second activity required students to practice the technique of observation. They were encouraged to observe themselves interacting with social media and use the "What? How? Why?" technique to complete

this observation exercise. The intention was to gain insights into how others interact with social media and start to build a deeper understanding of social media users (i.e., students could use the responses provided by their peers). Presented in Figure 6 is an overview of the conversation on MS Teams where the lecturer has outlined the activity's expectations, with students responding in the required manner. There were 12 replies and everyone used the suggested template.

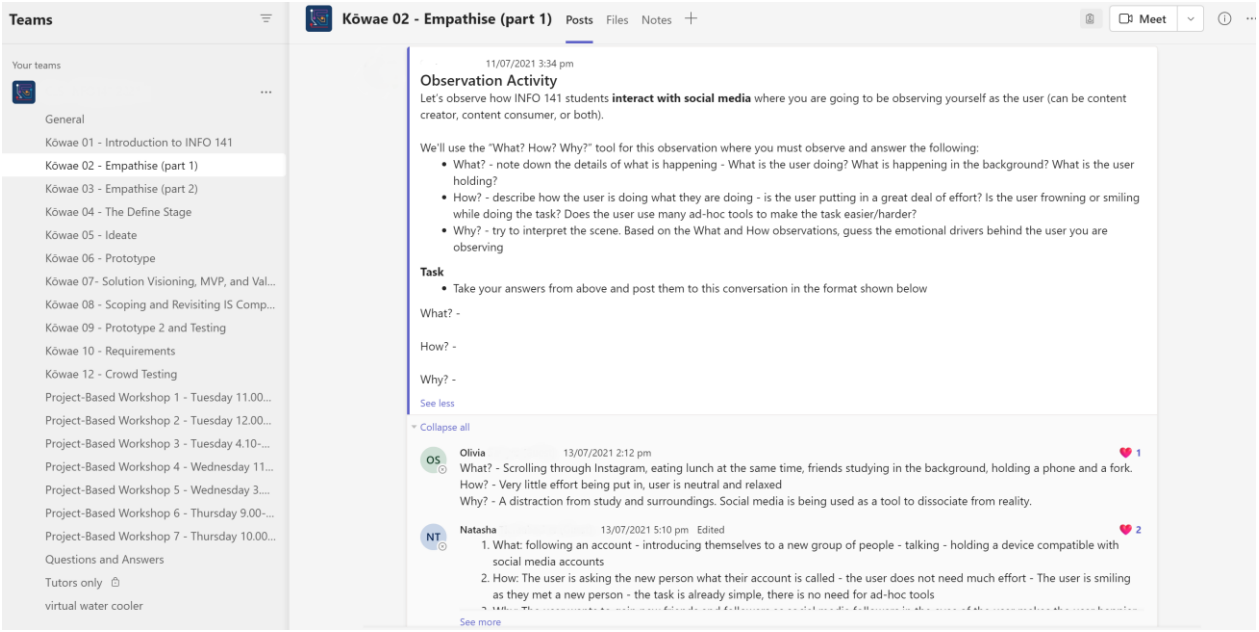

Figure 6. View of the Observation Activity Conversation on MS Teams and a Response from a Student

4.2 Contributing in the Activity-Based Discussion

In preparation for the activity-based discussion, the lecturer took the responses from the students and started identifying themes from the proposed questions. In total, eight were identified, including user types/profiles, social media/platforms, social media use, personal impacts, content, and advertising. These were then used as areas that students could focus on in terms of their project. At the beginning of the activity-based discussion, students were encouraged to sign into MS Teams while the lecturer prepared. Then, for the first 10 minutes, the lecturer introduced some of the slides from the content-based videos before turning their focus to the class activity.

As shown in Figure 7, the activity required students to consider the questions that had been posted during the learning resources and build upon them, add to them, and/or suggest that they have been grouped incorrectly. They could also suggest a new theme if they considered one had been missed.

Figure 7. The Activity for the Activity-Based Discussion

The lecturer added a conversation for each of the identified themes and the questions the students had generated during the learning resource interaction as shown in Figure 8. Students then spent 30 minutes completing the activity by collaborating in real-time, and adding their suggested questions as shown in Figure 8. There was a total of 71 posts by the students, the lecturer, and the tutor (who also got involved) as well as reactions with emojis to some of the posts made. No student suggested a new theme or the moving of questions instead focusing on the themes presented providing each one with a number of posts.

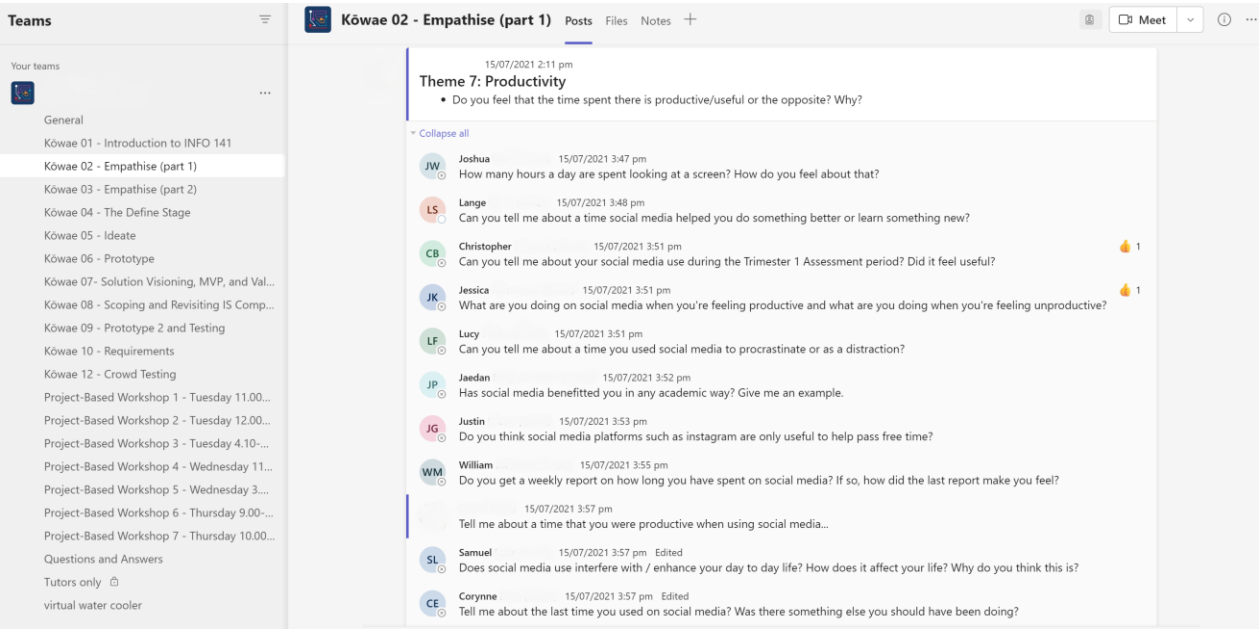

Figure 8. Students Collaborating in Real Time to Complete the Activity

Students were then encouraged to use these themes and questions to create an interview guide for their project-based workshop. In the second half of the activity-based discussion, students were given 50 minutes to work on their weekly sketchbook. Here the sketchbook was used to give students space and time to think about their project and how the content that they had been introduced to that week could be used. This week the lecturer provided the following three questions: 1. What are you going to put into your Information Gathering Plan? 2. How will you gather the information you need, and why are you gathering it? 3. What are the characteristics of your stakeholders? Students can then complete these questions in any application they want and were encouraged to use visuals if they could (i.e., you do not have to provide just text-based answers to explain your thinking for each of the questions). They also did not have to submit it at the end of the class but could work on it until the due date, which was generally a bulk date every three weeks.

4.3 Participating in the Project-Based Workshop

The goal of this week's project-based workshop was to practice the technique of interviewing while collecting information to inform their problem area for their project. To do this, students needed to create an interview guide and then interview other students (who are also social media users). First, when students arrived at the lab they had to sit in a space that related to the theme they wanted to focus on. Then, they had to partner with another student within that space. Once done, a timer set to ten minutes was put on the projector and the students had to create their interview guide or they could use their preprepared interview guide if they had it. If not, they could spend the time going back over the responses from the activity-based discussion to create their guide (as a fail-safe, the lecturer had also created a generic interview guide from these proposed questions that groups could use too).

Once the ten minutes were up, the groups of two got into groups of four. Here, Group A spent 10 minutes interviewing Group B with one asking the questions and the other being a note taker (they were encouraged to swap after 5 minutes to experience both roles). Once the time was up, Group B spent ten minutes interviewing Group A. The tutors spent this time going around to each of the groups discussing their work with them and offering feedback on their use of the interviewing technique.

After twenty minutes of interviews, groups were given 10 minutes to summarise their responses and were required to put them on their workshop's MS Teams channel, where a conversation for that week's workshop had been created. The conversation and posts by the students can be seen in Figure 9. This was done so that students could benefit from the wisdom of the class where instead of only having information from their single 10-minute interview they now had access to information from a lot more interviews that could be used to inform their problem area. They could not only see the posts by students in their project-based workshop but also had access to the other workshop channels.

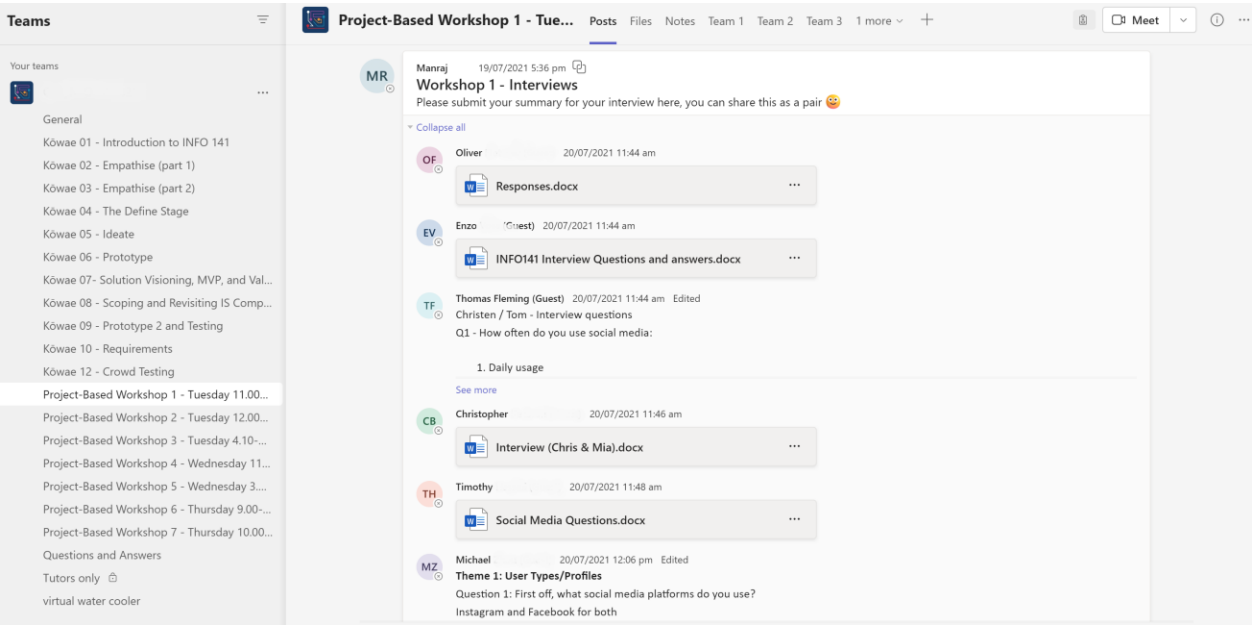

Figure 9. The MS Teams Conversation for a Project-Based Workshop and Responses from Students

5 Lessons Learned

Following our shift from a teacher-centered to a student-centered approach to learning, we have learned some valuable lessons. Presented in Table 1 are the approaches adopted, how we practiced them in our learning environment, and observations we made from this. For example, we adopted the constructivist approach when moving to a problem-based focus by using real-world problems as the context. Students worked on problems such as "how we can make healthy social media" or "how to improve the learning environments of the future." Authentic real-world problems enabled students to engage in learning as they were working on problems with which they could relate. Students showed a more intrinsic desire to learn as they could scope their own project for the design challenge and define a business problem that they were motivated to solve. Students appeared to have fun working on authentic problems compared to pseudo business cases.

However, the ill-structured nature of the problems held some students back, especially those who took longer than expected and were still discovering their purposes. Therefore, we incorporated context-suitable resources that were in a digestible size as well as the sketchbook to help scaffold authentic problem-solving learning. Learning resources (2-hour lectures and a long list of readings) were shrunk to digestible bits – three to five ten-minute concept-based videos, complemented by shorter readings and smaller learning tasks. The design reduced the complexity of learning and allowed students to learn at their own pace. For example, the English as Second Language students watched learning resources multiple times to make sense of the content. Students caught up with work demands or personal circumstances can learn the content bit by bit anytime and anywhere. The sketchbook then guided students through the learning process by asking them to reflect on what they learned from the resources, plan for how they can solve problems, and then work on their own strategies to solve those problems. Students took ownership of their learning in their sense-making process underpinned by consuming learning resources and expressing their understanding and ideas for their project. Unlike the "as-was" assignments which are assessed by the quality of artefacts, weekly sketchbooks were assessed on the extent of application and reflection. Thus, students had a safe space to make mistakes and be creative

and reflective. While grades were still important, students would pay more attention to exploring different techniques and methods during their learning journey

Table 1. Observations of our Student-centered Learning Approach

Student-centered Learning	Practices	Observations
Constructive approach: Authentic Problems	Use of realistic and relevant problems as the context for learning	Students dealt with authentic, ill-structured problems (e.g., the dark sides of social media, challenges of hybrid campus) during the "classes" (i.e., activity-based discussions and lab) and outside of classes as they learned and applied new knowledge
Constructive approach: context-suitable resources with a digestible size	Design of concept-based videos, readings, and other forms of resources that are in smaller chunks and are tailored for problems (i.e., final project)	Students consumed different types of learning materials at their own pace and related the content to authentic problems they are working on
Constructive approach: sense-making via doing and reflection	Use of sketchbook for planning, monitoring, and reflection	Students were prompted to explain and reflect upon their project and the problems according to the relevant concepts and principles
Collaborative approach: hybrid participation in a steady and sustainable pace	(1) A reasonable number of micro-tasks to scaffold weekly participation and learning (2) Timeboxing – participation (3) Flexibility in participating online and in-person	Students learned by completing micro-tasks embedded in concept-based videos (online), activity-based discussions (online and in-person), and workshops (online and in-person) while gradually equipped with capabilities to tackle authentic, ill-structured problems
Collaborative approach: shared artefact	All artefacts created during the analysis & design journey should be shared. Informal feedback on artefacts should be encouraged	Make learning more meaningful and motivational (going beyond submitting assignments)
Collaborative approach: Learning communities	Use of virtual spaces (MS Teams) as the primary channel and physical spaces (e.g., workshops in the lab) as the complementary channel to enrich quality interactions by blending technologies (learning management platform and collaborative platform) and interactions (social and task)	Students assimilated into learning communities consisting of blended technologies. Blended learning technologies possess the following characteristics: • Rehearsability: Students can fine tune their messages before posting their ideas and thoughts • Reprocessability: Students can process other's messages and then comment on and add to others' ideas • Richness of symbol sets: Students can choose different types of representations (text, video, pictures) • Persistency: Conversations stay in virtual spaces; students constantly interact with each other through hybrid spaces

In addition to the constructive approach that enables students to be independent and autonomous, our design incorporates the collaborative approach that values high-quality interactions among the learner, their peers and the teaching team (Hadwin et al., 2018). We embedded multiple micro tasks related to their project into activity-based discussions and project-based workshops. These tasks, designed to be small and simple, aimed to boost engagement. Recognizing the challenges of maintaining discipline in the flexible realm of blended learning, we observed that excessive autonomy might be problematic, especially for first-year students who may not yet possess adequate self-regulation skills. Our design, therefore, has been based on the premise of a sustainable and steady pace. For example, we aimed to distribute a similar number of tasks each week. For each task, we set a timebox to give students just enough time to finish it. We made students do the work. Through participation in different learning activities - whether in-person, online, or hybrid - students continuously refined their mental models as they created artefacts,

which were subsequently shared on MS Teams. Routine participation and feedback exchanges generated meaningful and quality interactions.

To sustain quality interactions, we embraced the collaborative approach of learning communities, enabling them through virtual spaces in the form of MS Teams, and complementing them with physical spaces, such as the lecture theatre, to advance the collective knowledge of the class. MS Teams offered common information and communication technology (ICT) characteristics such as rehearsability, reprocessability, and rich symbol sets (Dennis et al., 2008) and afforded students time to process information corresponding to their communication styles and learning needs. For example, we noticed that some students progressively entered into a central role in the learning communities, from passive participants to active participants. Beyond communication, MS Teams supports key knowledge management activities, including knowledge accumulation, integration, and implementation (Gibson et al., 2022). Different from monolithic learning management systems that are teacher-centered, MS Teams is a collaboration platform suitable for student-centered learning. Students not only generated and shared ideas about learning tasks but also engaged in project-based workshops and activity-based discussions. We observed collective sense-making among members of learning communities, which informed students' decisions and actions for their own projects. We recommend blending a learning management platform with a collaboration platform.

We also acknowledge the value of blending tasks and social interactions. From our observations, social interactions transpired in in-person learning environments, where causal collisions among learning community members helped their relationship building. For those students who could not attend in person most of the time, we established asynchronous, virtual social spaces (“virtual water cooler”). However, the use of the space for social interactions did not result in the same outcomes. This is possibly because the space was dedicated to social interaction without blending tasks related to student projects. Our course design, which focused on result-oriented collaboration, leaves no room to blend task and social interactions. For future course design, we consider formalizing the socialization component for collaborative learning (Paul et al., 2016). For example, we may encourage students to know about their counterparts and work styles before the beginning of challenging tasks. In the assessments, such as Sketchbook, we may ask students to reflect on how socialization helps collaboration.

We share lessons derived from our blended student-centered design, mixing different modalities, technologies, and pedagogical methods with others. We believe in a design gestalt (Yoo et al., 2006), where individual blended practices do not live on their own but rather depend on a holistic set of practices. Thus, instead of a specific plan and process to carry out practices, we suggest the educators craft configurations of practices tailored to their unique learning environments, encompassing teachers, students, and the milieu. Table 2 demonstrates configurations suitable for our contexts in which we discover the benefits of blending constructive and collaborative approaches. Practices based on constructive approaches, grounded in authenticity, contextuality, and reflectiveness, empower students to chart their own learning journey, thereby potentially rekindling student learning enthusiasm and fulfilling their unique needs. To sustain student engagement and cater to their needs, we rely on practices based on collaborative approaches characterized by flexibility, cadence, and socialization. We experiment with various student-centered technologies to support these emerging practices. As a result of the recalibration of modalities, technologies, and pedagogical methods, we began to see the relationship between lecturers and students restructure, tilting toward student-centered learning.

Table 2. Configurations of Practices for Student-centered Learning Approach

	Constructive Approach			Collaborative Approach		
	Authentic Problems	Context-suitable resources with a digestible size	Sense-making via doing and reflection	Hybrid participation at a steady and sustainable pace	Shared artefact	Learning communities
How might we rekindle student learning interest and help students refocus on learning itself?	X	X	X	X	X	X
How might we create a learning space that considers diverse students' interests and circumstances?	X	X	X	X		
How might we improve interactions and enable students to share their viewpoints?			X	X	X	X
How might we bring student-centered technologies to the forefront and make better use of technologies?		X (pre-recorded concept-based videos)	X ("sketchbooks" for students to explore and experiment ideas)	X (blending in-class technology, Zoom, and MS Teams)	X (MS Teams as student-centered technology)	X (MS Teams as student-centered technology)

6 Conclusion

After reflecting on the challenges students faced in the traditional teacher-centered learning space and the evolving needs for learning, we redesigned an information systems course for approximately 200 first-year students. The goal was to deliver a course that encourages student participation, allows them to practice the different techniques we introduce them to, and empower them to take control of their learning. We pivoted to a student-centered approach to learning, integrating aspects of both the constructivist and collaborative approaches, blending technologies, and redesigning the course from the ground up. Here we looked at how we could change the lecture theatre from a sage-on-the-stage lecture to a student-on-the-stage classroom, how we could make workshops more valuable to students, and how technology could assist us. This has resulted in us developing a more interactive course where students are expected to consume readings and concept-based videos before the activity-based discussion. The lecture, then, is replaced by an activity-based discussion where students complete an activity together in learning communities before taking some time to think about the work they are actually doing by filling out their sketchbook. Their project-based workshop allows them to practice the techniques they are trying to develop while getting feedback from tutors and their peers. All this is enabled by our use of a mix of technologies, in particular MS Teams, where there are weekly conversations between students with a persistent record of information generated (which can be used by students in the class).

By blending pedagogical methods (constructive and collaborative), technologies (teacher-centered and student-centered), and modalities (online and offline), we achieve the goal we had set of a more interactive, flexible, and engaging course. We elucidate our research rationale and provide rich descriptions of the implementation. Our findings enrich the current discussions around blended learning (Dick, 2021; Pye et al., 2022) by demonstrating how different design practices can be configured. However, while this paper gives the perspective of the lecturers, their experience, and observations from running the course and talking to some students about their experience, the next step is to get feedback from their perspective. That is, what aspects of the course they enjoy, what could be improved, and any other suggestions they may have. We would also like to discuss this with students who tend not to engage with any aspect of the course (regardless of the approach adopted). Finally, we have adapted this layout to another course which is the same topic but at a master's level. This means a smaller class size but

most of the elements still apply. We have also made some changes, such as using Miro for the sketchbook as it allows more interesting feedback opportunities for the students (such as using some of the templates provided to answer the questions asked). Further feedback on this approach in the course needs to be gathered before we can report on the findings but first impressions from the lecturers and students are that they really enjoy the structure.

6.1 Future Research

The intention of the paper is to present our own observations based on our experience of redesigning an IS course, aiming to encourage more engagement from students, tutors, and lecturers and to stimulate discussion within the IS community about how we teach IS. We believe this is an important discussion to have, especially with the changing landscape that we are all working with and the way in which our student's expectations are changing. This is in line with the philosophy of the journal *Communications of the Association for Information Systems* (CAIS) (Saunders et al., 2017), and in particular the IS Education track, where discussions around teaching practices are encouraged.

Of course, this opens up the possibility of many future research opportunities. The most obvious one is this, does the redesign actually encourage more engagement? While we can discuss this anecdotally, it would be fruitful to try and measure this and make adjustments as necessary. Further, an issue we have often discussed, is that the feedback we tend to get from students is from the extremes – those that loved the redesign, and those that disliked it. We think it is important to discuss the redesign with the students who sit in-between these extremes to get their views and understand what they require in order to increase their engagement. Lastly, we think it would be interesting to understand the different approaches that are being used across universities when teaching IS – are people still using more traditional approaches, or have they moved to a more student-centred approach? And, have they started implementing more technologies to make this happen, or have they mainly remained in the lecture theatre?

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