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The Future is Connection:

Collaboration, Creativity and Compassion in a Digital Society

Human-centred learning design for cross-cultural teamwork in higher education

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This paper examines how human-centred design elements can support designing for diverse computing cohorts, focusing on foundational programming teamwork subjects. In computing subjects, students are expected to collaborate in cross-cultural teams and engage critically with software tools and their implications for their users. However, first-year students concurrently navigate unfamiliar study and teamwork expectations, alongside working with cultural norms that might not be familiar. Working with diverse cohorts requires intentional design beyond setting a topic-appropriate project. The strategies explored are drawn from two undergraduate and postgraduate programming subjects. The approaches include using structured activities to prepare students for collaboration and teamwork, the appropriate use of relevant digital tools to support collaboration and feedback, and incorporating student background and experiences into assessment. Cross-cultural teamwork frameworks were also introduced to support teamwork practices. The findings highlight the importance of cultural framing, structured collaboration and making progress visible in blended contexts and provide practical guidance for designing collaborative experiences in computing education.

Keywords: teamwork, postgraduate coursework, computing education, first year undergraduate study, case study

Introduction

Preparing students to work effectively in professional practice is a challenge in computing education. While technical skills are a foundation, professional practice also includes working in diverse teams, considering different user viewpoints on products, and engaging with the impact of widely-used software tools such as Generative AI products. The World Economic Forum noted that "leadership and social influence" will be a skill of increasing use by 2030 (World Economic Forum, 2025).

This paper focuses on activities for foundational programming subjects at both undergraduate and postgraduate level. In one subject, over 80% of the students in the subject were international students, with many newly arrived in Australia at the time of the subject. Therefore, most of the cohort are navigating unfamiliar study and teamwork expectations, alongside working with cultural norms that might not be familiar.

This case study examines how human-centred design elements (Selkrig et al., 2023) can support designing for diverse computing cohorts. Strategies include considerations around preparation for teamwork, using technology for collaboration during teamwork, and explicitly incorporating student backgrounds and interests into assessment. These strategies provide practical guidance for designing collaborative and inclusive learning experiences for computing education and teamwork more broadly.

Context of the case study

This paper is written from experience across two related subjects delivered to students in IT and computing, which were connected to a policy to increase teamwork, projects and industry-related skills in courses. Both were the first in a sequence of project units that students undertake, culminating in a capstone project. The intention of the project sequences is to introduce students to professional skills and prepare them for

internships (similar to Herbert et al., 2024) and graduate roles. These subjects are delivered using project-based learning (PBL) pedagogies.

The first subject was a first-year, first-semester undergraduate subject, focused on using low-code software development platforms to develop a simple website. This subject was delivered to IT and cybersecurity students. Teams worked on their website from week four to week 12 of semester, and also completed a portfolio of individual tasks based around professional skills. The emphasis of this subject was on sustainability, which was delivered via seminars and class activities on sustainable and green computing, and by specifying a project theme related to sustainability.

The second subject was the equivalent subject for postgraduate students, however, focused on using Python to develop the final product. This subject was delivered to IT, cybersecurity, data science and software development students. It was core for all students, so contained students with a range of programming skills, from no experience to professional experience. Again, teams worked on their project for most of the semester. A key focus of this subject was cross-cultural teamwork.

For each offering, a broad project brief was provided to students; for example, develop a software product to support staff allocation to shifts. The expectation was that teams would refine this broader topic into something more specific and complete their assessment on this topic, which included initial research, a planning document, delivery, individual reflection and peer and self-reviews.

For these subjects, the contact hours consist of a one-hour online seminar each week and a two-hour in-person workshop, the latter being predominantly used for project work with teams. The first subject eventually added a one-hour tutorial on individual tasks related to the project; however, this was dropped after one offering due to low participation and an emphasis on blended materials instead.

Design principles for teamwork in blended and cross-cultural settings

The principles described in this section are connected back to the human-centred principles described in Selkrig et al. (2023) and provide a case study of how these principles can be incorporated in IT subjects. Students studying IT and computing are expected to have both technical and interpersonal skills and should be able to evaluate how technology is helping or harming themselves, their intended clients, and the wider community.

A key part of these principles is different forms of connection, which is made visible in several ways. Students are connected to fellow students, to academics (both individually and as part of teams), and to their backgrounds. The observations in the case study are informed by educator experience, student reflection and project artefacts collected across several offerings of both subjects.

Understand backgrounds and ways of working first

The subject cohorts were diverse in several ways. In the postgraduate subject, 84-90% of students in both semesters in 2025 were enrolled as international students, and several students enrolled as domestic being recent immigrants to Australia, usually as permanent residents. As an indication, in 2025, 69.3% of the students were from countries in Southern Asia, with the next most popular region being South-eastern Asia with 10.3%.

Programming skills range from no programming experience to having work experience as a software developer; some students in the latter category sought exemption from the postgraduate subject, however this was rare. English language skills are mixed as well, with some students without prior English exposure. It was noted by Pham et al. (2018) that international student issues are predominantly language-based, sometimes leading to isolation, or relate to a limited understanding of the local culture.

This context guided what was delivered in seminars, especially in the postgraduate subject. The seminars originally started as a Q&A session with few slides prepared, however these were developed in later semesters

into formal topics with pre-reading materials and active learning components. As PBL is a new learning style for many students, the ideas behind the teaching style were frequently reinforced throughout the project subjects, starting in seminars and continuing in workshops with tutors. Based on the recommendations in Kansal et al. (2022) for working with Indian subcontinent students in Australia, extra content on plagiarism was also included, walking through examples of what is and is not considered plagiarism. This connects to inclusion and learner-centred approaches and supports students to be successful in their new study program.

Practise teamwork first and on structured activities

Specific structured activities were designed to introduce students to the PBL mindset and the level of participation and collaboration required to be successful. As an example, the first two workshops of semester focused on matching up students into different teams for short class activities, before forming teams for the main project. These included sharing details about their existing skills, their reasons for undertaking this degree and reflections on previous collaborative experiences. This assisted in understanding who worked well together and what each student brought to the subject.

As an example of structured activities, once students were in teams, the teams in the undergraduate subject worked together on Agile games. These both introduced Agile concepts and provided an opportunity to work together in a guided manner (Ronald, 2026). These supported active learning and collaboration, as well as supporting professional skill development.

Use human judgement at times instead of technology

As noted in Steenhuis and Rowland (2018), student teams can be formed in several ways; however, there is no best way to handle team formation. Given the project subjects were in most students' first semester plan and most of the students did not know anyone else in the cohort, there was little benefit to allowing student choice instead of instructor choice.

In addition to the team activities in the first two workshops, students were asked to complete a survey outlining their past study and programming experience. As part of this survey, students were asked to answer an open question to describe their culture and background. The question wording was 'How would you describe your cultural background? For example, were you born in one country but attended school in another? Where have you spent most of your life living so far?'. The open question, with no closed option as such, allowed students to freely express their backgrounds. This is noted as good practice by Groutsis (2021) who suggests collecting cultural background, language, and country of birth at a minimum, alongside religion and global experience for further understanding. Instructors were asked to ensure teams were diverse in language, country, leadership skills and programming experience.

The openness of the question meant that use of computer-assisted team formation tools was challenging, as these rely on multiple choice answers and cannot take observations from classes into consideration, unless the provided team formation by the tool is overridden. This is an aspect where teacher and student presence is important. While teams were still not without issues, which admittedly is where learnings occur, it means the experience was normalised within classes as students could see that all teams were having similar experiences.

Make awareness of cultural differences explicit

A key goal for the postgraduate subject was to support students in understanding the impact of culture and in an inclusive manner. As background, several frameworks are relevant to this cohort, such as Hofstede's cultural dimensions (Hofstede et al., 2010) and Lewis's model of culture (Lewis, 2012). There are recognised limitations of Hofstede's model, including the idea that country delineation is a challenging boundary to use when speaking about cultures and that Indigenous groups were not considered. Midway through the semester, these frameworks for teamwork were introduced during a seminar. Regardless of limitations, this allows students to start thinking about the idea of cultural aspects within their teams.

In many student reflections, these aspects were discussed at a high level without specific examples from the semester project. However, when they were discussed, the recurring themes were those of communication styles and individual/collective aspects. A student from a European background noted that 'significant cultural differences were apparent. For example, in my culture, people can be very direct. In Asia, however, people tend to be more careful with their words and might therefore be more easily offended by [European] directness.' The main takeaways from students were to listen, ask questions, and consider the best method to share information: verbally, in writing or by including diagrams as well.

The above material revealed to academics that culture was affecting how peer reviews, submitted individually and electronically with group tasks, were being undertaken. Some students were very complimentary about team members who were not meeting expectations, which was very noticeable in teams with very different cultures. Other students were overly critical of and directly honest about all team members, even those who were performing adequately. As this was considered a training exercise, the actual reviews were not provided back to the students they were written about; however, the authors of the reviews received feedback on their reviews. Although examples of useful and not-so-useful peer reviews were provided to students, this still means evaluation of peer reviews need to be carefully considered in similar contexts.

Reimagining project structure for inclusion and blended settings

The format of the project affects how teams work together. Originally the project was a single large task, which meant students needed to work out the tasks and divide them among themselves. For the past two offerings, the project specification was changed to be a suite of games, aligning with a more flexible approach. This allowed for less dependence between team members without removing the team component entirely, which was an important consideration for students adjusting to new countries and learning systems. This also allowed students to work at their level of programming skill and still contribute to the team's work.

In the final offering, the cultural focus of the subject was brought into the project specification, where teams were asked to deliver games that introduce children to different cultures. This allowed students to share more about their backgrounds and shape the project to their interests, supporting connection beyond the classroom.

Make progress visible inside and outside of class

The use of technology for collaboration within teams and with teaching staff is an essential element for project work. For programming projects, teams had access to a GitHub repository, which all teaching staff had access to as well. This is an authentic approach to software development collaboration. Teams were also encouraged to use Microsoft Planner, as this was supported by the university, so that teachers could also easily see their plans. For flexibility, teams could also choose other collaboration platforms; however, these could not be accessed by teaching staff if they were outside the university's IT system. However, an option to submit individual updates via the learning management system provided an alternative way to connect with staff and raise concerns and achievements.

These approaches allowed teaching staff and students to connect and engage outside of class, increasing opportunity for interaction, and exposed students to the use of software for collaboration.

Conclusion and future work

This paper has demonstrated how human-centred learning design principles can support introductory programming subjects, especially with diverse cohorts. The principles were applied across two subjects to develop collaboration and cross-cultural teamwork skills for computing students, with a view to preparing students for further project work and professional practice.

Working with diverse cohorts requires intentional design beyond setting a project. The findings highlight the importance of cultural framing, structured collaboration and visible progress, and respond to the challenges students face when moving into unfamiliar academic contexts.

Future work involves refining and evaluating these approaches, focusing on authentic and industry-aligned experiences that build the connection between learning and professional practice.

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