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Future-Focused:

Educating in an Era of Continuous Change

Connected group work: Building thriving learning communities through purposeful and diverse randomisation

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Group work is widely used in tertiary education to develop collaboration, develop teamwork and communication skills, and manage large class sizes. It supports active learning and often leads to higher engagement and improved learning outcomes. Yet creating truly diverse teams at scale is a major combinatorial challenge. We evaluated a diversity maximising random grouping strategy in a third-year Project Management course. A qualitative analysis of the intervention indicates that this approach helped students meet new peers, form friendships, gain confidence to speak up, and enhance peer learning. Furthermore, the randomisation was positively received by students and was consciously perceived as a benefit. This simple, sustainable practice can be used by educators to create resilient and inclusive learning environments.

Keywords: active learning, randomised groups, group work, qualitative, higher education

Background

Group work is a pervasive element of tertiary education, shaping both in-class interactions and assessment tasks. Its widespread adoption is motivated by three key factors: the principles of social constructivism, which frames learning as a collaborative meaning-making process (Hirtle, 1996); the development of graduate qualities such as teamwork, communication and leadership; and the pragmatic need to manage increasing student-to-staff ratios.

Group work provides a natural pathway to active learning, where students engage in activities and reflect on their learning. There is overwhelming evidence that active learning increases conceptual understanding, persistence and academic performance across STEM and management disciplines (Bonwell & Eison, 1991; Freeman et al., 2014; Zwolak et al. 2018). Within the active learning umbrella, cooperative learning provides a structured form of group work in which students share clear goals, individual accountability, and positive interdependence to achieve higher academic outcomes and stronger interpersonal skills (Johnson & Johnson, 1987).

A fundamental determinant of group-work success is group composition. Empirical studies show that how groups are formed influences educational effectiveness (Kohli et al., 2023; Pulgar, 2025), member motivation (Lambić et al., 2018), and the emergence of communication and organizational structures (Dzvonyar et al., 2018). Moreover, heterogeneous groups allocations can improve equity and diversity, and create inclusive learning environments (Lambić et al., 2018; You, 2024).

Research indicates that group formation methods fall into three main categories: random assignment, student-controlled assignment, and instructor-controlled assignment (Dzvonyar et al., 2018; Srba & Bielikova, (2015). Notably students often respond negatively to randomised groups due to a loss of agency or the perception that their academic performance will be impacted (McClelland, 2012). However, there is evidence that randomised grouping brings significant benefits such as elimination of social barriers, increased knowledge sharing and increased engagement (Liljedahl, 2014; McClelland, 2012).

In our context, we are interested in the problem of creating diverse, weekly group allocations over a semester for in-class active learning tasks. However, construction of heterogenous groups poses a difficult combinatorial problem, worsened by repeated group allocations over a semester. We suggest that minimising repeated group members in groups creates sufficiently heterogeneous groupings. This strategy is both mathematically sound and validated through a qualitative investigation with undergraduates in a project management unit.

Teaching Context and Motivation

This study was embedded in a third-year project management unit with a semester-enrolment of 74 undergraduate students. In Semester 2, 2024, the course was redesigned around a series of active learning tasks during class time. This was accompanied by a shift from conventional lecture and tutorial classes to a single large “lectorial”, which blends elements of both (Thalluri & Penman, 2018).

To support this pedagogical shift, the unit moved into a purpose-built learning environment featuring six-person round tables, high-top benches, and four distinct collaboration zones. A team-teaching model placed the course coordinator and two tutors in the space simultaneously, enabling real-time facilitation of group tasks and creating a supportive, flexible learning environment. In this context the lectorial is where a lecture and tutorial are combined in a group focused workshop setting. This specific lectorial format flipped the classroom. Theoretical content is delivered by the Learning Management System (LMS) before class whilst the lectorial centred on students participating in active learning tasks.

These changes to the unit were motivated by the desire to:

1. eliminate structural barriers faced by underrepresented students in forming groups
2. create an equitable approach to group work that prevents solo-status and promotes diversity
3. enhance peer learning through heterogeneity
4. support the development of broader social networks and inclusive learning communities beyond existing friendship groups

The in-class active learning tasks were conducted with randomised groups. Complimenting this, from week 3 onwards students worked over the semester on a project-based assessment. For the project groups students were able self-select into groups based on area of interest. The dual group types were motivated by practical needs of assessment and the UDL “multiple means of engagement” guideline (CAST, 2024). This innovative hybrid group model simultaneously removes barriers to participation, creates equitable and diverse collaboration and empowers students with agency over their learning.

Diverse and Inclusive Group Allocations

We are interested in the problem of finding repeated group allocations in a cohort, for example students are placed in a potentially different group each week. We call such repeated allocations that are devised over a semester the “schedule”.

It may seem like diverse group allocations require the consideration of academic ability, ethnicity, culture and socioeconomic status with each group. Unfortunately, even if an educator could obtain and use all that demographic data, finding a grouping schedule that meets every constraint is computationally infeasible due to the extreme combinatorial scale. We take the view that by randomising the group allocation schedule sufficient diversity is achieved over a semester.

Under uniform random allocations any given student is expected to see 9.4 repeated group mates over a 13-week semester assuming 100 students enrolled and group sizes of 5 (formula available on request). Since this is an average, there are some cases it is likely that a given student will be exposed to a greater number of repeated group mates or far fewer.

Finding group allocations schedule where no group members repeat is known as the “Social Golfer Problem” (Liu et al., 2019), which is well studied combinatorial problem. Unfortunately, as of writing we are not aware of an efficient algorithm that can exactly solve this problem for any given number of students, groups and weeks.

Therefore, we resorted to an approximate solution using a genetic algorithm to search for a suitable schedule. Given only a few minutes on a 5-year-old laptop we can find a schedule for a cohort of 100 students and groups of 5 students without any repeated group mates. Such a schedule was used for this study. The randomisation of students was further augmented by randomisation of a designated leader and deputy leader role, allowing all students to take turns on leadership roles over the semester.

Research Questions and Method

Building on our motivations, we posed three research questions:

1. In what ways and to what extent do randomised group allocations cultivate inclusive networks and strengthen social bonds among students?
2. In what ways and to what extent do randomly assigned groups influence peer learning?
3. How do students perceive and accept the practice of randomisation?

We conducted a preliminary qualitative study using a focus group with students and tutors. Ethics approval to collect the data was received by The University of Sydney (2024/HE001051). One student focus group was conducted. All students in the course were invited to participate, and five students accepted and gave their formal consent (n=5). Student participants were a mix of domestic (4) and exchange students (1) with all being native English speakers. The two tutors were also interviewed one-on-one. Interview recordings were transcribed, and participant names replaced with identifiers: S1–S5 for the students and T1 and T2 for the two tutors. One research member conducted thematic analyse of the student and tutor interviews using a six-step approach (Braun & Clarke, 2006). Transcripts were printed, read and annotated then coded manually on a topic-by-topic basis. The coded data was then analysed, interpreted and discussed amongst the team.

Results

Cultivating Inclusive Networks and Strengthening Social Bonds

Weekly randomised group allocations consistently broadened students' peer circles and sparked new friendships. For example, one student described how randomisation pushed them out of their comfort zone:

> "So with standard tutorial, I always just sit with my friends… But with the rotating I have to push myself out there to talk to the new people I met every week. I think it's a good chance to know more people in the same unit." [S3]

Another quiet participant echoed this sentiment, noting that randomisation compelled them to connect and eventually form lasting bonds:

> "I'm usually a very quiet guy… but with the randomisation I was forced to talk to other people… And yeah, I've made a couple of good friends over a few weeks." [S4]

As weeks passed, these brief encounters deepened into more robust relationships. One student reflected:

> 'I think, in terms of knowing more people. This class helped me to know more people in the same unit. But in terms of like stronger connections. I feel like I definitely have stronger connection with my teammates compared to other unit' [S3]

Tutors observed parallel effects, noting that

> 'The social aspect of the (group) randomisation plus the active learning allowed students to experience other students in a social, fun, academic way (when they don't have their student study persona on), enable them to form a deeper and quicker connection by seeing multiple sides to a student's personality.' [T1]

Together, these reflections suggest that weekly randomisation not only introduces students to a wider network of peers but also lays the foundation for stronger, more resilient social bonds.

Influencing Peer Learning

Randomised group allocations not only broadened students' networks but also deepened peer-to-peer learning by encouraging active dialogue, mutual support, and shared motivation. As one student reflected,

> 'You can chat about it with your peers, and then you can come to an understanding' [S5]

This collaborative engagement was especially evident during a class debate, where peer support added real value to content mastery:

> 'I think the one which we engaged the most was during the debate, because we were helping our like one of our groupmates who was going to stand for the debate. So, I think that sort of added a lot of value to what we were learning, because it was like we were learning about agile as well. So, I think, as Katie mentioned before, I think that week we really engaged, and we were like sort of understanding what we are learning better.' [S1]

Moreover, simple gamified incentives such as awarding "hats" (six hat thinking) harnessed peer enthusiasm to draw even quieter students into the activities:

> 'The hats didn't really affect me that much in terms of I didn't really care if I got a hat or not, but since my teammate really wanted one, it kind of pushed me to be more active in all of the activities' [S2]

Another added:

> 'I think the hat was a good incentive for our team to work like in the beginning... If a member could like, solve or crack the code, or something like that of the task that was given, it used to be like. Oh, it would boost the motivation of the whole team as well with that, and I think it did have some sort of an effect for us.' [S1]

Beyond motivation and understanding, heterogeneity also bolstered students' confidence to participate. One student explained that working with different peers each week made speaking up feel more natural:

> 'For me. I personally feel like the activities when, like, we get to work with our teammates, and then different people at different week make me feel like I have like more confidence to speak in the workshop later on.' [S3]

Tutors confirmed that pairing extroverts with quieter peers lifted overall engagement, creating a classroom climate where all voices could emerge:

> 'They get those extroverted or highly participatory, engaging students to chat with other students at their table who aren't really engaging that much. So, I think it has that effect and that like, we'll get these overachievers, they're trying to more include students that are at their table.' [T2]

Student Acceptance of Randomised Groups

Overall, students expressed strong approval of the weekly randomised seating and grouping strategy, highlighting its role in breaking routine patterns and encouraging engagement with new peers. Many noted that randomisation made the large cohort feel more manageable and fostered a sense of familiarity with people they might never have spoken to otherwise.

For example, one student remarked, "I think randomizing was good, because then you recognize people," [S5] emphasizing that simply seeing different faces each week lowered the barrier to conversation. The enforced rotation also pushed some students outside their comfort zones, with one noting, "With the rotating I think I have to push myself out there to talk to the new people I met every week. I think it's a good chance to know more people in the same unit" [S3]

Discussion, Limitations and Future Directions

Several students commented they liked randomisation for the first few weeks, then preferred to sit with project group as students then needed to find time outside of class for group work 'we kind of had to create another time outside of class to meet' [S2]. This was reinforced by tutors commenting they found students sitting in their project groups, rather than randomised groups in the final course weeks and struggled to get them to sit in their allocated place. Educators may like to consider implementing randomise groups in the first half of a course, then discontinuing them once student have met and connected with peers.

As a preliminary, single-cohort investigation (n = 74; focus-group participants = 5), our findings have limited generalisability. The small, self-selected sample and reliance on qualitative data mean we can speak to perceptions but not to effect sizes or behavioural outcomes.

Building on this preliminary work, our next step is to replicate the study in 2025 with a new cohort of students, integrating a mixed methods design. In this next iteration we plan to introduce quantitative data collection via surveys to capture more data from students to help capture broader and deeper data to enhance our understanding of student perceptions. We will also investigate failure rates and unit evaluation scores to determine the impact of this initiative on learning outcomes and student experience. At the same time, we will refine our qualitative protocol by revising focus-group prompts to more precisely elucidate the impact of randomisation.

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