



Identifying and developing the factors necessary for the creation of functional groups

Jeremy Lindeck, Tania Machet, Timothy Boye, Eva Cheng, Scott Daniel and Tanvi Bhatia.

University of Technology Sydney,

Corresponding Author Email: Jeremy.Lindeck@uts.edu.au

ABSTRACT

CONTEXT

In 2020, research was carried out into three, group-work based engineering and IT undergraduate subjects each with approximately 600 students. The research was focused on students' experience of online group work, and what emerged were several factors that contributed to developing a capacity for successful group work online. These factors included common expectations amongst group members, students' confidence in themselves and fellow group members, and a strategic approach to task completion.

PURPOSE OR GOAL

Students frequently find group work assessments challenging and unenjoyable due to reasons unconnected to the assessment itself. Tensions within the group may result in students not participating in the task, disengaging from the group work, and in extreme cases dropping out of the subject. Meanwhile, other students have to pick up the slack and complete the remaining work. Factors such as group trust, individual attitude and aligned motivation have been identified as indicators of successful group work. We aim to further understand the conditions necessary to creating functional groups and to use this knowledge to develop tools and activities to help create functional groups.

APPROACH OR METHODOLOGY/METHODS

Over three semesters, focus groups of first- and second-year students in subjects requiring group work discussed factors contributing to their group's success or failure. Focus groups were also run with tutors to determine features they considered important in creating successful groups. The data was analysed for themes that indicated the factors that support and inhibit the development of functional groups. These results have been used to adopt tools and develop activities to improve group dynamics which will be used in future classes.

ACTUAL OR ANTICIPATED OUTCOMES

This research provides further indications of the elements contributing to group achievement. It has given insight into conditions that need to be avoided for groups to succeed. The literature suggests that confidence, attitude, and motivation are fundamental to collaboration. Analysis of focus groups has supported this and suggests that developing student agency may help students achieve these. The research has guided the implementation of tools and activities that can be used to help students to improve their ability to work in groups.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

Success in group work depends on developing student trust in their own abilities and the abilities of their groupmates and these are supported through development of student agency. The research has presented tools and activities that promote and develop individual agency in a group context and foster students' confidence in themselves and fellow group members, and a strategic approach to task completion.

KEYWORDS

Group work, teamwork, online

Introduction

This paper builds on work presented at last year's AAEE conference on the transition of three group work-based subjects of approximately 600-1000 students each to online tutorials. In this research, we identified factors that enabled or inhibited the success of online groups and adapted activities to facilitate successful group work. To further this research, interviews were carried out with tutors, the following cohort of students, and the tutors who taught them. The aim was to understand the effect of our efforts to mitigate the difficulties of working in groups online.

Focus groups confirm the research of Wildman et al. (2021), which states that the change to online learning had psychological effects on students. These repercussions included perceived increased levels of hesitation in decision making and forgetfulness. Wildman et al. (2021) and Du et al. (2018) reported that online groups are prone to greater levels of non-participation from group members.

Dulebohn and Hoch (2017) observed that poor communication and low participation is not just an issue for university students, virtual teams in industry often suffer from lower levels of engagement and a lack of trust between team members.

Du et al (2018) suggest that a key factor in successful group work is trust based on responsibility and a motivation to achieving common goals. This in turn helps develop mutual understanding and greater cooperation. Xu et al. (2014) note that control of emotions is more difficult when the emotional cues of a face-to-face meeting are absent. Trust between tutor and student and student and student is an essential element of any learning experience but is much more difficult to establish online.

This paper analyses the experiences of tutors and students in their attempts to create and work in online groups. We investigate how the conditions for successful groups can be established and evaluates the methods tried so far. We use Lencioni's (2002) '5 Dysfunctions of a Team' as a lens for team-work issues affecting students. The paper makes recommendations on improvements and areas that can be developed in the future.

Background

This paper is centred around tutor and student experience in their second and third semester of online classes due to the onset of COVID-19. Not surprisingly the situation was less fraught than during the first semester. This was indicated by a significant decline in the drop-out rate and a reduction in student requests in later iterations of the subjects. Everybody became better at coping with the 'new normal'.

Previously, we identified the following factors in predicting successful group work. Firstly, motivation, students needed to be engaged for functional student groups to exist. Wade et al. (2016) indicate that motivation was partly facilitated by icebreakers, and a high degree of tutor interaction with tutors checking in with each group each tutorial. Another factor was students' willingness or otherwise to speak and have their cameras on in groups. The more group members got to know each other, the more they would develop confidence in their teammates. In addition, the setup of the group and the division of work was seen as a factor in group success. Groups who gave thought to how they worked together and used a skills-based approach to divide work tended to be more successful.

During the second and third semesters of online groups, the three subjects developed new materials and techniques designed to increase self-efficacy, encourage motivation, and improve the quality of group work.

Teaching strategies and tools

Pre-work

Online quizzes to encourage students to complete pre-work

Even when these subjects were in-person, it was difficult to get students to engage with pre-class work. In an online environment, when students have a shorter attention span, pre-work was more important. In groups, where few students had completed pre-work, not enough people had the knowledge to participate in team tasks. Whilst tempting for the tutor to spend class time going through pre-work, this was counterproductive as students soon believed there were no consequences for not doing pre-work.

To encourage students to engage with the work, students were given weekly multiple-choice quizzes on the pre-work. This accounted for 10% of the final mark. These quizzes were successful in that most students did enough to pass them. However, they still may not have achieved the required depth of understanding to fully contribute in class.

Although there is a tendency to try to cover more material by adding to pre-work, it is important not to over-burden students. This runs the risk of students giving up. Moreover, for students to value the tasks, there must be explicit link between pre-work and class work.

In-class

Greater use of icebreakers and group and whole class activities

Feedback from first semester 2020 identified that some students became disconnected. More effort was made to introduce icebreakers to help develop relationships within the tutorial. In the first tutorial, 'getting to know you' exercises were used to build understanding and empathy. Quizzes on character and personality traits were used to create functional project teams in week 3. These activities helped students understand their teammates' personalities, ways of working, strengths, and weaknesses. This prefaced activities to get groups them to think about how they would work together. Other 'lighter' team activities were used to maintain group relationships throughout the subject.

Icebreakers influence group cohesion, but other factors also influence. There were still students who did not engage with the subject or their group.

The use of Mural

Mural could be described as an online platform for butchers' paper and post-it notes. It allows students to brainstorm, add ideas anonymously to a collective online board. This was used for both whole class and group activities. The advantage of Mural was that students could present their ideas anonymously without fear of judgement. It also allowed teams to formulate their projects, as notes and ideas were moved around and built upon each other.

Informal feedback from students and tutors was positive. As tutor's expertise developed, more innovative ways of using Mural were discovered improving student interaction.

Regular group check-ins with tutors

Tutors checked in with each group each week. The group summarised their project progress and the areas on which they were working. These check-ins gave each group the opportunity to discuss issues and to be guided to keep their project on the right track. This worked well in that the tutor was well-informed on group progress. However, too often the tutor would struggle to get groups to communicate directly. Some students preferred to communicate through text without cameras. In addition, it was often the same voices representing the group each week.

Tutors and subject coordinators had weekly meetings to establish teaching team identity and cohesion, as well as share ideas and provide feedback for agile response.

Drop-in sessions for students

Each of the subjects organised weekly one-hour voluntary drop-in sessions for students with the subject coordinator. These sessions gave students an opportunity to ask questions about the subject. Although there was a noticeable upsurge in attendance around assignment deadlines, these meetings were generally not well attended.

Methodology

The project took a qualitative approach to investigate the phenomenon of online group work. Data points were collected including semi-structured student focus groups, tutor focus groups, student feedback survey comments, and student self and peer-feedback results.

One group of four students and one group of three students were asked to elaborate on prompts on their experience of group work. The students had either just completed first year or second year group work subjects. Students' results in these subjects ranged from credit to high distinction. These results were broadly reflected in their Weighted Average Mark (WAM)

Two tutor focus groups were held who had taught on one or more of the three subjects. Tutors were asked to respond to prompts about their observations of online teams, activities to help students engage, and factors determining success. These discussions were compared with the results of the student focus groups.

Each semester students complete a feedback survey and relevant comments were isolated for analysis.

In all three subjects, students were asked to evaluate their own and their group members' performance. Comments around this were analysed to understand how groups functioned.

After data collection and with ethics approval, multiple data points for the same participant were collated for review. All data was analysed for common themes using thematic analysis. Four researchers reviewed and analysed the data and each other's findings, and discussions reviewed commonalities and differences between those findings before a final set of themes were developed. In particular, the data was investigated to see whether greater experience of being online allowed students to develop greater understanding and new strategies for learning.

Students have been given pseudonyms to protect their privacy.

Findings

The themes that emerged from the data indicated that our adaptations to activities and use of tools impacted on the effective functioning of groups. However, there were additional factors that influenced group success, such as familiarity with the online environment. A few emerging factors correlate to the negatives in the five levels of dysfunction described by Lencioni (2002). Lencioni's pyramid is introduced to students mid-semester as a group reflection exercise (see Figure 1). Groups are encouraged to assess whether any of these stages are applicable and if so, to take steps to remedy the issues.

Time

Not surprisingly, tutors and students were more familiar with working online. This is demonstrated by the reduction in email queries after the first semester. All students in our focus groups had at least one year of online experience. As students and tutors became more familiar with expectations, feelings of unease dissipated. That is not to say that they liked it better.

*Online learning makes it harder for everyone to interact more. It seems rather limited.
(Student comment from SFS survey)*

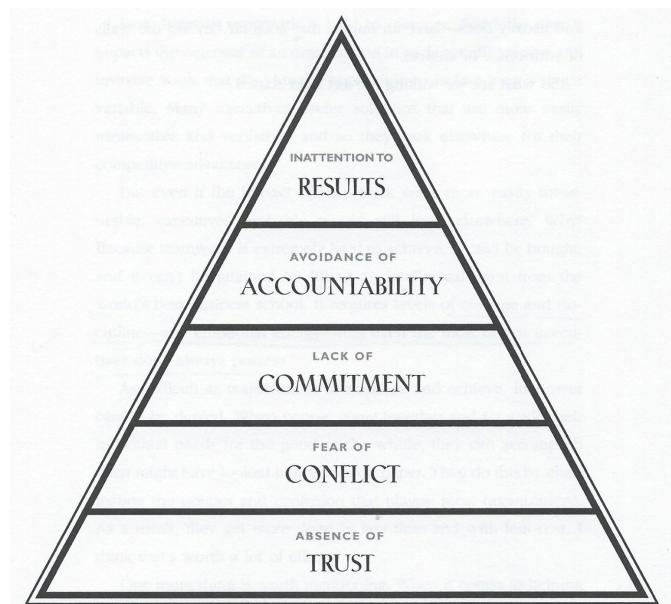


Figure 1: Lencioni's pyramid of five levels of dysfunction of a team (Lencioni, 2002)

Trust

Developing trust is an essential element of successful group work. Tutors and students both find it difficult to work in an environment where there is no rapport, cohesion or immediate feedback. When students' cameras are switched off it is impossible to gauge peer reaction. Tyler (2019) states that for trust to be achieved there needs to be transparency and honesty within the group. This means being willing to display vulnerability in front of your group members (Zartler, 2017). This is unlikely to occur in an unfamiliar environment where reaction is uncertain.

The students who are in their early twenties or late teens are judged all the time so they will look silly in front of peers. So no matter how many questions you ask in class you don't really get a response. (Kevin, tutor)

Methods to develop a collegiate spirit within classes included greeting each student at the start of class, messaging students who did not contribute to check everything was ok, and using online polls to encourage student feedback. Strategies were introduced to encourage group members to be more accountable to their peers.

EngCom and CITP spend the first few weeks trying to establish the principles of good teamwork amongst the team, there is understanding of what the team roles are, there is understanding how to plan, there are some ice breakers. (Rob, tutor)

The building of a community both within the class and within online teams is essential. A lot of this comes down to attention to individual students paid by tutors.

Pushing for them to at least have their cameras on, at least get to go through some icebreaker activities so that they have a structure to know each other becomes crucial. (Wendy, tutor)

I think the students know that when you notice them, and their contribution is missed or appreciated. (Jane, tutor)

Fear of Conflict

Fear of conflict is connected to lack of trust. If group members are unable to be vulnerable in front of each other, it is unlikely there will be open discussion. Groups that discuss issues

openly enjoy each other's company and will frequently go off task. Our tutors were aware of this and would let these conversations continue.

If I was dropping in on a call to see how they are and they are laughing and talking about something, I would take myself out and not interrupt because there was some value in that engagement. (Charles, tutor)

It was the groups that were silent that were more of a concern. Tutors would try to contact a group to find they were offline or there were only one or two members present. Fear of conflict would seem to be linked with lack of communication.

Commitment and accountability

In university group work, commitment is equally as important as trust as a catalyst for successful groups. Students in groups with commitment to the task, both enjoy the subject and are successful.

I have a subject where I'm in a group and we're actually doing things fine because everyone wants to work. (Peter, first-year student)

It is easier to avoid commitment in an online environment. Students could disappear if they hadn't completed a task. It is more difficult to let someone down when you must face them in-person.

It is easier to get to know people face to face than it is online, and you've gotten to know them., You have kind of, I think, you feel more pressure to do well for these people that you know, rather than these random people on the screen. And so, there's more accountability within the group. (Florence, first-year student)

Inextricably, linked to commitment is motivation. This manifests itself when there is misalignment of motivation within groups. To mitigate this, newly formed groups develop a group charter outlining how they will work together. Groups negotiate their expectations, norms and ways of working, including the grade they hope to achieve. Despite these efforts, there remains a disconnect between students wanting to achieve a high grade and those who want a pass.

"Teamwork is a mixed bag. You can get people who really work with you and want to get an HD [High Distinction], but then you also get people who are still trying to understand whether they want to do this subject or whether they have the right amount of time commitment." Tony (second year student)

Online tutorials make it easier for uncommitted students to avoid accountability.

"It is easy now I get to be a passive learner; I get to kick back and listen to everybody else and let people who want to talk can talk." Charles (tutor)

Student focus groups suggest that many students make little effort to engage with the subject or their group and rely on other people to get their mark for them.

"At University if someone's not pulling their weight you have to just keep on carrying them." Calum (2nd year student)

Students in the focus groups recognised they had conflicting goals. They understand that group work is an essential skill for their career, and that it is a major aim for the subject.

'Group work is a skill that throughout university we have to develop so that we can actually apply it when it comes to work.' Peter (First year student)

However, students find it difficult to apply these skills when working with less engaged group members. It was often easier to take on the extra work themselves allowing less productive group members to avoid accountability.

'From a personal perspective, I work hard, and you need to get good marks, so while I think teamwork is important for the long term. I can't help but be caught up in the short-term rationale.' Polly (first year student)

Although it is understandable that students want to protect their marks. They are not practicing the skills found in a functioning group and are allowing the less committed student to avoid any accountability.

'If someone didn't do it then we would then allocate their bit to everyone else to try and get that done.' Florence (First-year student)

Attention to results

Whether students display a lack of attention to results depends on how results are defined. Most students define a successful result as the grade at the end of the subject with many students seeking the highest grade possible. Given that students need to pass the subjects to proceed with their degree, motivation to pass is high.

A successful result is seen by tutors and some students as learning the skills required to work in groups.

You get to meet other people who are more likely to be interested in the same field as you are. They may be from different backgrounds and have different views on certain things in the same topic so it's good to be in a team with different people rather than just like-minded friends. (Philip, first year IT Student).

On the other hand, not all students see the need for working in diverse groups, believing that their future career will either involve working alone or in teams of people similar to them. Both tutor groups state that it is important to explain why group work is a skill that is worth learning.

'You have to explain to them. You will be communicating with other people in groups for a living. Whatever you thought the job was it is probably not. You have to talk to a range of stakeholders. You have to get along with people that you may not like, and you have to talk to people that may have different levels of technical expertise.'
Charles (Tutor)

Consequently, initial lectures and activities are developed to highlight how communication skills and the ability to work in teams will be important to their future career. In the last semester more effort has been put in to explaining how the tasks are relevant to their university studies and their future career.

Leadership

It was interesting to note that although groups were not required to have leaders, many teams chose de-facto leaders. This was reported in the self and peer-assessment and in focus groups. It seems that groups found it necessary to have someone specifically tasked with organising and keeping track of their project.

".....took the leadership role, was really good at organising everyone and making sure everyone got their work done." Student comment on teammate on SPARKplus.

Some students reluctantly took on the role of leader, because they were frustrated by the lack of progress.

"I think I was the dominating one because, you know I wanted to do well and everyone else did want to do well but I feel I just cared a bit more so." Polly (first year student)

What worked well and how we can build on it.

Icebreakers

Teams that functioned successfully were inclusive. They developed through building student trust, especially early on through icebreakers. It was found that inclusive tools such as Mural were successful in that they allowed students to present ideas visually and build upon them. Problem solving activities were popular as they are low stakes but appealed to students' creativity and at times competitive instincts. In the next iteration of the subject, activities will be introduced at the first weeks that will necessitate students using their cameras. The intention is to set inclusive norms early to become a habit when students are working in smaller break out rooms (Castelli and Sarvary, 2021).

Greater attention to group formation

Despite the issues, most of the student groups functioned well. Self and peer-assessment comments on fellow group members were mainly positive. Compared to last year there was a greater understanding that different skill sets would contribute to the task in different ways. This was reflected in the way groups decided to work and how tasks were divided to suit student strengths.

"I do believe students have different strengths. They definitely should play to their strengths, that's how you can achieve a better mark." Anthony (2nd year student)

To develop this understanding greater attention was paid to group formation. In pre-work before groups were formed, students took quizzes to better understand their preferred learning styles, personality and character traits. In class, students shared this information with their group members and used it in dividing tasks and developing working styles.

"I think getting to know earlier on what their strengths are, so everyone has a unique way of contributing. Some of the subjects we have been teaching focus on learning styles or personalities to see they have the language to express what they are and just to give some personality to individuals in a particular group." Jane (Tutor)

The goals and ways of working were documented in the group charters, which were completed in the first team time session. In future iterations of the course, it may be useful to have teams revisit and revise this contract at regular intervals.

In the next semester, a series of scenarios based on real group issues will be introduced to newly formed group for discussion. It is hoped that by discussing these issues early through case studies, students will be aware of the risks, and build capabilities to address, and avoid them.

Regular reporting on progress to increase accountability

As it is easy for students or groups to go missing in online tutorials, regular check-ins were especially important. Tutors would focus on facilitating group work and would make efforts to hold group members accountable by having them explain their ideas. Groups were particularly motivated when they were asked to present to other groups (social accountability). These groups were then tasked with giving feedback to a specified group. In addition, external 'Design Guides' questioned students on their designs during selected tutorials and gave suggestions on improvements.

"When groups check in, it means that they sense check their progress regularly. And they will quickly find out if the group is stirring in the wrong direction, because perhaps, they have listened to a more dominant member of the team who has misinterpreted a certain bit of the assignment." Keith (Tutor)

It was noticed that in these reporting sessions, the same students reported every week. For the forthcoming session, it is planned to have a timetable for students to report, this ensures that every student needs to be connected enough to understand the group plan. To further increase feedback on tasks and reduce student uncertainty, students will submit a draft of

their final report. They then present this draft to another group, give feedback to that group on their draft, and summarise the feedback they receive. This has been made a graded assessment to encourage students to be more active in the feedback process (Nicol and Selvaretnam, 2021).

Leadership

Our findings indicate that groups will appoint leaders or that team members may be compelled to take the leadership position. This semester there will be a section in the group charter where students discuss whether they want team roles (including a leader), and what they want from that leader. They can then make a more informed decision as to who that leader should be and the qualities, they should have to help the group function efficiently.

Conclusion

Lencioni's model works well in describing the conditions that need to be in place for online teams to be successful. However, in an online university context, commitment is probably of equal importance to trust. If students are not committed to the task, trust cannot exist. The building of relationships, rapport, and cohesion between students and between tutor and students is essential for establishing successful groups. These relationships can be facilitated through icebreakers, regular tutor check-ins, assurance and group accountability.

Students need to be encouraged to reflect on their groups' requirements for success and how these conditions can be brought about. The idea of leadership and what it means within these online groups needs further investigation.

Students become better at online learning with more experience. However, group work is much easier to facilitate in-person, especially with first year students, as it is easier to counteract the five dysfunctions and build social cohesion.

References

- Castelli, FR, Sarvary, MA. Why students do not turn on their video cameras during online classes and an equitable and inclusive plan to encourage them to do so. *Ecol Evol.* 2021; 11: 3565– 3576. <https://doi.org/10.1002/ece3.7123>
- Du. J, Fan. X, Xu J, Wang C, Sun,L, Liu. F (2018) Predictors for students' self-efficacy in online collaborative groupwork. *Association for Educational Communications and Technology* Oct 23. P767-791
- Dulebohn J.H, Hoch J.E. (2017) Virtual teams in organisations. *Human Resource Management Review.*27. P567-574
- Lencioni. P. (2002) *Overcoming the 5 dysfunctions of a team; a field guide.* Pfeiffer
- David Nicol, Geethanjali Selvaretnam. (2021) Making internal feedback explicit: harnessing the comparisons students make during two-stage exams. *Assessment & Evaluation in Higher Education* 0:0, pages 1-16.
- Tyler. D,(2019) Develop the 5 behaviours of teamwork. *BeefVET* <https://www.beefmagazine.com/animal-health/develop-5-behaviors-teamwork>
- Wade,C.E, Cameron. B.A, Mogan K.A, Williams K.A (2016) Key components of online group projects: Faculty perceptions, *The Quarterly Review of Distance Education*, V 17(1), , pp. 33–41
- Wildman. J.L, Nguyen D.M, Ngoc S.D& Warren. C. (2001) Student Teamwork during COVID-19:Challenges, Changes,and Consequences. *Institute for Cross Cultural Management, Florida Institute of Technology, Melbourne, USA* P1-13.
- Xu.J, Du J& Fan X (2014) Emotion management in online groupwork reported by Chinese students *Association for Educational Communications and Technology* P795-818

Zartler.J. (2017) Lencioni's 5 Dysfunctions of a team. Taskworld. <https://medium.com/taskworld-blog/lencionis-5-dysfunctions-of-a-team-330d58b2cd81>

Copyright statement

Copyright © Jeremy.Lindeck, Tania Machet, Timothy Boye, Eva Cheng, Scott Daniel and Tanvi Bhatia 2021 : The authors assign to the Research in Engineering Education Network (REEN) and the Australasian Association for Engineering Education (AAEE) and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to REEN and AAEE to publish this document in full on the World Wide Web (prime sites and mirrors), on Memory Sticks, and in printed form within the REEN AAEE 2021 proceedings. Any other usage is prohibited without the express permission of the authors.