Title: GATES: An online step-wise tool to develop student collaborative teamwork competencies

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Abstract

Group assessment is an important collaborative learning structure for development of graduate teamwork competencies. However, group assessments are often associated with poorer learning outcomes due to highly negative student experiences involving tension and conflict. In this study, an online tool incorporating four strategic 'GATES' (*Team structure, Communication, Leadership,* and *Situation monitoring/Mutual support)* was designed to support the social processes required for team cohesion. The 'GATES' tool was evaluated using mixed methods in an observational, correlational (cross-sectional) study of 693 undergraduate and post-graduate university students and five academics in five Allied Health university courses with a group assessment task. Participants completed two anonymous questionnaires (previous experiences and current experiences) that generated both quantitative and qualitative data. In the first, 95.19% (178/187) of respondents reported a previous group assessment experience, and the experience was negative for 19.1% (34/178) of these students, with 85.3% (29/34) attributing this to group member behaviour. All academics reported issues with previous group assessments they had delivered. Of the students who used the tool (n = 52), there was no statistically significant association between gender, CALD status, or age with group assessment experience. However, 56.9% (29/52) of students and all five academics found the tool useful for getting the group started early, and for managing team issues. The tool appeared most helpful with organisation and planning than in managing team issues, potentially due to the tool negating issues before they arose. Overall, our study's findings indicate that 'GATES' keeps students on track and provides timely support during the team management process.

Keywords: Assessment; Blackboard; GATES; group work; team; group assessment

Introduction

With globalisation and the rapid pace of technological change, university graduates need to be equipped with essential skills to thrive and adapt in highly demanding workplaces (Dittman et al., 2010; Elgort et al., 2008; Hansen, 2006). Graduate capabilities must therefore include collaborative skills with communication at the heart of the key competencies required for future employment. To prepare students for the challenges of the real world, higher education curriculum structures often try to incorporate authentic collaborative learning experiences (Kuisma, 2007; Nordberg, 2008; Sharp, 2006; Webb, 1993). This is particularly important for Allied Health units seeking to produce highly qualified graduates who will likely be placed in interdisciplinary teams working in life or death situations (King et al., 2008).

The collaborative learning approach has a number of positive pedagogical and practical benefits (Scott-Ladd & Chan, 2008). It involves the integration of small group learning experiences that promote the use of social processes to complete an academic task (Guo & Stevens, 2011). This can manifest in a curriculum as authentic team assessments, which create learning conditions supporting the development of communication, conflict resolution, and negotiation skills, whilst instigating interpersonal adaptability. This effectively mirrors the experience of teams in the professional world (Witney & Smallbone, 2011). Consequently, employers value highly graduates with teamwork experiences as the associated skills are considered an important graduate capability (Cranmer, 2006). Several studies have shown that team assessment encourages students to take ownership of their learning through the exploration of different perspectives, whilst developing problem solving and critical thinking skills (Scott-Ladd & Chan, 2008). These processes contribute to deeper learning, shared understandings, and long-term retention of concepts (Guo & Stevens, 2011; Oakley et al., 2004; Witney & Smallbone, 2011).

Although theory and literature highlight the need for group assessment, academics can be apprehensive about incorporating it into their curriculum structures. Coordinators often report frustration due to challenges faced with resolving student conflict and team management (Witney & Smallbone, 2011), while students frequently report problems with domineering team members, 'hitchhikers', non-cohesive strategies, and divergent views (Freeman, 1996; Oakley et al., 2004). These intra-group tensions can often lead to de-motivation and conflict (Scott-Ladd & Chan, 2008) resulting in poor learning outcomes and lower grades (Burdett & Hastie, 2009).

Students are not inherently equipped with the skills required for high performance teamwork, i.e. group management, conflict resolution, negotiation, and communication skills (Oakley et al., 2004). Hence, explicit steps should be taken to teach students to embody evidence-based principles of teamwork that will allow them to manage logistical and interpersonal problems as they arise. Many studies have focused on creating an 'instructor's guide' for teachers to support teamwork learning and assessment (Dittman et al., 2010; King

et al., 2008; Oakley et al., 2004). However, these methods require academics to devote considerable time to preparing and facilitating team workshops at the expense of time spent on course concepts and skills.

Research has further been conducted on the use of online environments to facilitate group work assignments (Alexander, 2006; Fearon et al., 2011; Goold et al.; Gudmundsson & Southey, 2012; Kashefi et al., 2012). However, studies have shown that teams managed exclusively online provide significant social barriers for some students (Alexander, 2006; Goold et al.; Witney & Smallbone, 2011). Educationalists now contend that a blended approach including both online and face-to-face time provides more flexibility and considerable support for group work (Fearon et al., 2011; King et al., 2008). Also, much of the literature supporting teamwork and group assessment tasks present arguments from the perspective of potential employers, and the graduate skills and capabilities they require, rather than from the student perspective and the benefits to their learning (Livingstone & Lynch, 2000).

Opportunity for innovation

The literature provides an overwhelming amount of evidence that team-building strategies increase capacity for holistic group learning and assessment, with many studies aiming to develop effective teamwork strategies for teachers to integrate into their curriculum structures. The incorporation of information and communication technologies to aid group work has also been extensively investigated. However, these studies have focused predominantly on the means by which technology can provide additional tools for communication between team members. Therefore, there is a significant need for a 'low-maintenance' tool that combines both of these research efforts as well as addressing the gap in the literature regarding the benefits to students' learning experience. Such a tool would guide students through an evidence-based framework to develop team competencies without the need for teacher-directed workshops or interventions, thereby effectively reducing students' anxiety, stress, and time commitment to group assessment tasks.

Aims and Objectives

The overarching aim of this research project was to develop a sophisticated, low-maintenance tool to improve the collaborative competencies of students engaged in group-work assignments that did not impact on the coordinating lecturer's workload. This tool was not intended for use as the sole platform for student communication, but rather as a replacement for face-to-face teacher-directed 'workshops' on building team skills.

Several project objectives were formulated around achieving the development of a tool perceived as 'ideal' for industry stakeholders in the healthcare sector. The main objective was to design the tool in such a way that students are guided through different evidence-based stages for managing processes and building cohesion in allied health teams. This would

take into consideration logistics such as enabling optimal team size, assigning team roles, expectations, goals, as well as strategies for avoiding or handling problems. Another objective was to operate the tool through Blackboard Learn (http://anz.blackboard.com/index.html) enabling accessibility for staff and students worldwide. Blackboard provides a variety of Web 2.0 platforms (e.g. wikis and blogs) that can be utilised within a structured learning module. Finally, the usefulness of the tool was evaluated through an examination of group assessment tasks in five different Allied Health courses at an Australian university.

Methods and Methodology

Design of the GATES tool

The GATES tool is based on the concept **G**roups **A**dvance into **T**eams **E**nabling **S**uccess. It was designed to be integrated as part of the group assessment task on a course's Blackboard site (Supplementary File I). It comprises a platform of four sequentially released 'GATES'. Each 'GATE' was specifically developed to integrate core teaching and learning principles within an evidence-based framework. The 'GATES' tool was modelled on the TeamSTEPPS 2.0 framework. This is an evidence-based strategy specifically developed to optimise team performance in the healthcare sector which incorporates five key steps (*Team structure, Communication, Leadership, Situation monitoring, and Mutual support*) (US Department of Health and Human Services, 2015).

The first 'GATE' addresses *Team structure* by directing students to assemble their team through a group registration task. Groups are set up to allow a maximum size of five, which is based on research that suggests three to five individuals is the optimal team size to allow a sufficient variety of ideas, skills, and approaches to problem solving (Oakley et al., 2004). GATE 2 requests students to *Communicate* by setting out rules for their engagement through the development of an agreed 'contract' posted on a wiki page. Setting clear guidelines upfront has been shown to enhance team functioning by formulating a common set of expectations to improve students' learning experiences (Duncan, 2013; Mutch, 1998). This has the additional benefit of serving as a publicly posted 'quasi-legal document' that supports good behaviour and prevents invalid claims on team agreement (Oakley et al., 2004).

GATE 3 enables *Leadership* through directing students to develop their own action plan on a separate wiki page. Here, students decide upon the roles and responsibilities of each team member as a group, rather than electing a 'leader'. This helps the team develop a collaborative, inclusive, and relational leadership approach where all students can embody core leadership responsibilities. GATES 1, 2 and 3 must be completed before students begin work on their group assignment.

Situation monitoring and *Mutual support* are both incorporated into GATE 4, which guides students through a periodic review process. Students are directed to review team progress and individual contributions on two separate occasions throughout the semester to

identify problems that need to be addressed. Students are then instructed to provide *Mutual support* to their team members in response to the periodic reviews, using strategic approaches to reduce conflict and barriers to progress in a constructive manner (Scott-Ladd & Chan, 2008). At the conclusion of GATE 4, students are led to the submission portal for their assessment.

Implementation of GATES

The 'GATES' online interface was developed using the Articulate Storyline® software which enabled the tool to be embedded in the Blackboard sites of multiple courses with group assessment tasks. University ethical clearance was obtained (Ethical Approval Number 1600000550) to conduct research into students' and academics' perceptions of the usefulness of 'GATES' in facilitating teamwork competencies in group assessments in the university's courses. The tool was evaluated in an observational, correlational (cross-sectional) study in a cohort of undergraduate and post-graduate university students and the academic course coordinators of five Allied Health courses. Mixed methods was employed as both quantitative and qualitative data were collected.

Participant recruitment and data collection

An email was sent out to all schools in the university's Faculty of Health inviting course coordinators with group assessment tasks to participate in the research project. Five course coordinators agreed – two from the School of Clinical Sciences (one Pharmacy and one Paramedicine course), one from the School of Biomedical Sciences (Infection and Immunity course), one from the School of Optometry and Vision Science (Microbiology course), and one from the School of Public Health (Population Health course). The tool was demonstrated to the five participating course coordinators, and then embedded in each of the five courses' Blackboard sites across both semesters of the 2017 university teaching year. An introductory email was sent out in the first week of semester containing participant information and inviting students to participate in the research project. Students who did not wish to participate in the research project were requested to 'opt out' through contact with the research team and were removed from the email listings and subsequent data collection reports. Participants in the five student cohorts were contacted via email at the beginning and end of the semester and provided with a link to an anonymous online survey hosted by the Key Survey platform.

Phase I: Prior experiences of group assessment tasks at university

This phase investigated academics' and students' previous perceptions of group assessment tasks within Allied Health courses. The data collection tool for the student cohort comprised a questionnaire with 12 questions – eight with a selection of answer options, and four requiring a free-text response (questionnaire is provided in Supplementary File II).

The questionnaire contained three questions to determine the cohorts' demographics followed by five questions using either a Yes-No response format or a 5-point Likert scale response format (Strongly Disagree – Disagree – Neutral – Agree – Strongly Agree). Student participants were asked about previous experiences with group assessment tasks, if the behaviour of other group members impacted on their group assessment experience, beliefs regarding whether group assessments were an effective and fair means of assessing their knowledge, and whether the group assessment process might be made easier if support tools for team building were provided.

The five course coordinators were also asked to complete an anonymous, online questionnaire comprised of eight questions – three demographic questions, three requiring a Yes-No response, and two with a 5-item Likert scale response (Supplementary File III). They were asked if they had previously run group assessment tasks in their courses, and if so, had they experienced team issues in previous years, and did they think resources to help build teamwork competencies might be useful. These questionnaire results provided a baseline comparator for the results of the second data collection phase conducted at the end of the university semester after 'GATES' had been deployed into the Blackboard sites in these courses.

Phase II: Experience of current group assessment with or without 'GATES'

As with the first questionnaire round, participating students were emailed the link to an anonymous, online questionnaire in the last week of the semester. This second questionnaire comprised 14 questions – three demographic questions, and then 11 questions regarding 'GATES' (one with a Yes-No response, four with a 5-item Likert scale response, and six requiring a free-text response). Students' were asked their perceptions of the 'GATES' tool and their perceptions of the group assessment experience with or without using the 'GATES' tool (Supplementary File IV). Course coordinators of the participating units were also emailed a questionnaire comprising five questions requiring free-text responses. They were asked their experiences of coordinating the group assessment task, if they believed the 'GATES' tool had changed students' experiences of the group task compared with previous years, had they employed any other strategies to facilitate teamwork and team competencies, and any general comments about the tool Supplementary File V).

Data Analysis

Quantitative data were analysed using IBM SPSS Statistical Software Version 25. Cross-sectional associations with experiences of group assessment tasks (with or without using 'GATES') were investigated using Chi-square tests of independence and logistic regression. Qualitative data were analysed by two different methods. First, the data were analysed using the text analytics tool, Leximancer®, to provide a global context to the data, and highlight the significance of identified concepts. Second, the data were coded manually following a three

pass coding methodology described by Saldana (2009). Using two methods provided triangulation of methods. Each method contributed insight to the data in different ways.

Leximancer® analyses text by converting lexical co-occurrence information from natural language into semantic patterns in an automated manner. "It employs two stages of co-occurrence information extraction – semantic and relational – using a different algorithm for each stage. The algorithms used are statistical, but they employ non-linear dynamics and machine learning" (Leximancer, 2017). Leximancer® was used to analyse the content of the text and display the extracted information visually as a concept map. Its use provided a means of quantifying and displaying the conceptual structure of the text, enabling an exploration of the relationships between the identified concepts. Concept maps in Leximancer® are heat mapped by colour (Supplementary Files VI, VII and VIII). When converting to black and white images the concept circles were numbered in order of importance with '1' being the most important.

The second phase of the qualitative data analysis process involved analysis of the interview transcripts using a manual 'holistic' coding process described by Saldaña (2009). Throughout the interview transcripts, 'codes' were assigned to various passages to evoke the essence of their meaning in salient points. Codes which had a similar thread or 'pattern' were grouped into 'categories'. During the third cycle of analysis, 'codes' and their associated 'categories were synthesised into themes.

Results

Student Participants

Of the total cohort of 693 students, 26.98% (187/693) students completed the beginning-of-semester questionnaire and 14.72% (102/693) completed the end-of-semester questionnaire. Of the 187 participants in the beginning-of-semester survey, 28.9% (54/187) were males and 71.1% (133/187) were females. The participants' age ranges and CALD (Culturally and Linguistically Diverse) status were also captured (Table 1). Of the 102 participants who completed the end-of-semester questionnaire, 28.4% (29/102) were male and 71.6% (73/102) were female. As with the first questionnaire, the participants' age ranges and CALD (Culturally and Linguistically Diverse) status were also captured (Table 2).

Phase I: Prior experiences of group assessment tasks at university

Students' questionnaire responses

Of the 187 participants, 75.4% (141/187) had previously participated in group assessment tasks at university. However, 178 students had completed a group assessment task at high school, university, or both. Of these, 19.1% (34/178) reported that previous experiences with group assessment tasks were negative, 29.78% (53/178) were neutral, and 51.12% (91/178) reported previous group assessment tasks as positive experiences. Of the 34 participants who reported negative experiences, 85.29% (29/34) agreed that the behaviour

of other group members impacted on their group assessment task experience. A Pearson's Chi-square test of independence was considered to test the association between previous experience of group assessment tasks and beliefs that the behaviour of other group members impacts on group work experience. However, the cell counts violated one of the test assumptions and therefore a statistically significant conclusion could not be drawn.

Students were also asked if they believed group assessments to be an effective and fair means of assessing their knowledge. There was a statistically significant association between students' previous experiences of group assessment tasks and whether they believed group assessments to be an effective and fair means of assessing their knowledge (χ^2_4 = 40.544, p < 0.001). A higher proportion of students who reported negative experiences with group assessment tasks (67.65%, 23/34), compared with 13.33% (12/90) of students who reported positive experiences with group assessment tasks, did not believe that group assessment tasks are an effective and fair means of assessing their knowledge.

Of the 176 students for whom there were data, 57.39% (101/176) believed that the group assessment task process would be easier if resources to support team competencies were available to group members. A higher proportion of students who reported previous group assessment tasks as positive experiences (66.67%, 60/90) agreed that the group assessment task process would be easier if resources to support team competencies were provided compared with students who reported negative experiences (29.41%, 10/34) with previous group assessment tasks (χ^2_4 = 17.053, p = 0.002).

Of the 47 CALD students in this cohort who had previous experience with group assessment tasks, 61.70% (29/47) found group assessment tasks a positive experience, 34.04% (16/47) gave a neutral response, and only 4.26% (2/47) reported group assessment tasks as a negative experience. The proportion of students who had a positive previous group assessment task experience was significantly different between CALD and non-CALD students with a greater proportion of CALD students (61.7%, 29/47) compared with 47.19% (61/129) of non-CALD students reporting a positive experience (χ^2_2 = 9.37, p = 0.009). A higher proportion of CALD students (48.94%, 23/47) compared with 21.71% (28/129) of non-CALD students also believed that group assessment tasks were an effective and fair means of assessing their knowledge compared with the non-CALD students (χ^2_2 = 13.731, p = 0.001). There was also a significantly higher proportion of CALD students (72.34%, 34/47) supportive of resources being available to support team competencies and help students manage team issues if they arose compared with 51.94% (67/129) of non-CALD students (χ^2_2 = 8.722, p = 0.013).

Participants were then asked to briefly describe their previous experiences with group assessment tasks, and responses were received from 165 students. The concept map produced from the Leximancer® analysis (Figure I) yielded nine themes. The concept map was recorded at theme size 33% with visual concepts set at 86%. The themes in order of importance (hottest colour to coolest colour according to the colour wheel) were 'work', 'members', 'experience', 'time', 'different', 'negative', 'parts', 'achieve', and 'ideas'. When converted to a black and white image, these concept map circles were numbered in order of importance with '1' being the most important. The theme 'work' (1) covered individual group members' workloads including references to hitchhikers and the increased workload placed on rest of the group. Negative responses included:

> *"We had a couple where everyone didn't participate equally and got the same marks…"* [SP159]
>
> *"Not all members pulled their weight and the distribution of work wasn't fair, however everyone received the same mark."* [SP21]

There were also positive comments relating to workload:

> *"We were easily able to determine who did what in the group and worked together well, taking everyone's thoughts into account. we all really wanted to do well so we allowed everyone to question and edit."* [SP191]

Responses also included comments regarding different expectations regarding the quality of the work produced:

> *"People have different ideas on what is an acceptable standard of work which brings the marks down for everyone. In my experience group assignments are an unfair way to be assessed altogether and I don't think any tool will help that."* [SP48]

The theme 'members' encompassed comments about how group members worked together – either effectively or struggling with hitchhikers. Poor behaviours of group members dominated the comments under this theme. For example:

> *"Had a team member from hell who ended up being removed from the group due to her behaviour and inability to work with anyone."* [SP12]
>
> *"Lack of effort from certain team members, resulting in them receiving grades they don't deserve and increasing stress on other members."* [SP19]
>
> *"My experiences depend greatly on my team mates. If I'm able to choose a group I have not had any issues, but if we are assigned them problems arise more often."* [SP47]

The codes generated from the manual coding process could be divided into positive and negative experiences (Table 3). These 'positive' and 'negative' themes both linked to the main themes in the Leximancer® concept map. The 'positive' theme encompassed students' appreciation of the diverse perspectives from group members, the benefits derived from effective planning and communication within the group, an appreciation of the reduced stress to individuals when all group members shared responsibility for group outcomes, and importantly, students enjoyed the social experience that can come from group work. There

was acknowledgement in these comments that group work can be a rewarding experience when things go well. The 'negative' theme encompassed reports of communication issues, different expectations of the quality of the final assessment piece, different skills levels amongst group members (thereby increasing the workload of those more highly skilled members), the difficulty of working with friends particularly when having to have conversations regarding work output or work quality, difficulties scheduling group meetings, hitchhikers and the fact that everyone in the group may receive the same mark regardless of contribution, and dealing with strong, controlling personality types or bullies. Many students reported these negative experiences as stressful.

Academics' questionnaire responses

All five participating academics reported having used group assessments previously in other courses in the higher education setting, and all responded that they had previously experienced team issues among students with group assessment tasks. One academic cited serious issues with breakdowns in student relationships, fighting, and non-contributing team members. Two academics responded that although they provided the opportunity for students to peer review each other's contributions (utilising a peer assessment marking tool), they still experienced problems facilitating group work. All agreed that they would continue to use group assessment tasks in the future and were looking for resources to help them better manage issues amongst student groups. At the time of the study, four of the five used resources such as team-building activities in workshops to support students doing group work.

Phase II: Experience of current group assessment with or without GATES

Students' questionnaire responses

Of the 52 participants who used the GATES tool, 38.46% (20/52) were of a CALD background. There was no statistically significant difference in usage of the GATES tool between CALD and non-CALD students, between genders, or age groups. When asked if they found the tool helpful for building a cooperative team environment and managing team issues, data were missing for one participant, but 56.86% (29/51) reported finding the GATES tool helpful. There was no statistically significant difference between CALD and non-CALD students regarding perceptions of the helpfulness of GATES to manage team issues.

Due to violation of the cell count assumption of the Pearson's Chi-square test of independence, an association between students' experiences of the semester's group assessment task and how helpful they found the GATES tool could not be tested statistically. However, of the 51 students who used the GATES tool and for whom there were data, 74.51% (38/51) reported a positive experience with the semester's group assessment task and of these 71.05% (27/38) found GATES helpful in facilitating teamwork.

Students were next asked if they felt all their group members contributed equally to the assessment task. Of the 102 participants, 70.59% (72/102) reported that all group members contributed equally to the assessment workload. The association between contribution of group members to workload and helpfulness of GATES tool in building a cooperative team environment and managing team issues again could not be tested statistically due to inadequate cell counts for Pearson's Chi-square test of independence. However, of the 52 students who used the GATES tool, 55.77% (29/52) found it helpful in managing team issues, and of these, 68.97% (20/29) reported that all group members contributed equally to the assessment task's workload.

Students were then asked to describe positive and negative experiences of their group assessment task, with responses typed in free text format. The Leximancer® concept map for students' descriptions of their positive experiences is depicted in Figure II – theme size was set at 33% and visible concepts at 85%. The themes in order of importance in the Leximancer® concept map are 'team', 'different, 'task', 'communication', 'discussion', 'workload', and 'time' which are numbered in order of importance with '1' being the most important. Each theme and supporting excerpts are presented in Supplementary Files VI, VII and VIII. The 'team' theme encompasses the social aspects of the group experience and therefore is linked to 'discussion', 'communication' and 'different' (describing the different perspectives, opinions, and knowledge that the various group members brought to meetings). Students' positive experiences were about the human interactions in the group process. Having a reduced individual workload was also appreciated.

The Leximancer® concept map depicting students' descriptions of their negative experiences is depicted in Figure III – theme size was set at 33% and visible concepts at 88%. There were seven main themes heat mapped in order of importance – 'work', 'members', 'time', 'difficult', 'meet', 'discussion', and 'everyone' which are numbered in order of importance with '1' being the most important. The main theme 'work' encompassed comments about getting all group members to contribute equally to the workload, and was linked to poor communication, difficulty getting everyone together for meetings, struggling to get responses to queries from team members and hitchhikers in the group. Each theme and supporting excerpts are presented in Supplementary File X. Interestingly, the word 'struggling' or 'struggled' appeared in many of the text extracts for students' negative experiences. So common was its usage in the text that it appeared on the Leximancer® concept map. It evokes a sense of frustration on the part of conscientious group members in dysfunctional teams.

The manual coding of the data of students' descriptions of their end-of-semester assessment experiences yielded very similar codes to the data on their previous experiences, and again were themed into 'positive' and 'negative' themes. A higher proportion of students from the 'used GATES' category (60.87%, 14/23) reported effective planning and

communication as a positive experience associated with their group assessment task. Two students from teams that had used 'GATES' also commented that having an effective action plan contributed to their positive experience of the group assessment task:

"It was easy to get going, everyone was on board from the beginning." [SP98]

"Having an assessment timeline and reflecting our progress made it a lot more organised." [SP40]

Another two students whose teams had used 'GATES' felt that their group experience was positive due to shared quality expectations regarding the final assessment piece.

"We were all like-minded and had similar expectations for our outcome." [SP85]

"My team members are very engaged with public health and their academic results. This is an excellent combination when doing a group project! everyone was very friendly and open to ideas." [SP37]

A larger proportion of students who didn't use 'GATES' reported their group assessment experience as positive for social reasons (69.23%, 9/13) compared with those who did use 'GATES' (30.77%, 4/13).

With regards to negative experiences, a larger proportion of students who used 'GATES' (85.71%, 6/7) reported the negative experience of the group assessment process was due to group members not sticking to the agreed action plan, or lack of planning (80%, 4/5). A higher proportion of students who didn't use 'GATES' (77.78%, 7/9) reported their negative experiences were associated with difficulty scheduling group meetings.

Those students who had used the GATES tool were then asked to reflect on whether they thought it assisted the teamwork process. Some didn't think it made any difference:

"I don't think it helped or hindered the experience. The first part was helpful in organising our group due dates for the semester." [SP7]

"We did not find it useful." [SP18]

whereas other groups found it helpful in the initial planning stages but not so much in the later stages of the assignment process.

"It was good in the inception and planning phases but didn't help much after the initial meetings." [SP14]

"I think going through the GATES tool as a group early in planning stages was very helpful for us, as it took a bit of pressure of each other to enforce our expectations (we already knew each other personally so it can be slightly awkward to work with someone and tell them what is required of them). Additionally, it helped us tick off key milestones in completing the assignment." [SP10]

"Helped get the group started." [SP12]

"It gave a good basis to start the work." [SP23]

Academics' questionnaire responses

At the end of the semester the five academics reported the following when asked their experiences of facilitating the group assessment task in their course:

"*Very little facilitation needed."* [AP1]

"There were a couple of groups who said they had hitchhikers but I don't think they used the GATES tool to help. Most of the groups appear to have had no problems." [AP2]

"The experience was similar to previous years. It's a challenge because external students are not able to meet in person. Many of them didn't appear to have any issues but some provided feedback on Insight that they thought group work for (1) external students or (2) for master level students was not needed. (Our industry partners would disagree.)" [AP3]

"I think the GATES tool got the students working on the group assignment faster than in previous years (I have run this assessment task for the last three years.)" [AP4]

"Overall, the group assessments went smoothly and there was only one issue of a student not contributing to their group assignment." [AP5]

When asked if they believed the embedded support provided by GATES had changed students' experiences of the group assessment task compared with previous years, they responded:

"I can't say but less emails regarding group contact issues. This was a very good cohort with few issues all round this year." [AP1]

"…. They [this particular cohort] would only focus on assessment - driven activities - the comments I overheard about using GATES was it was this extra thing the unit coordinator wants us to do - this 'annoying' other thing." [AP2]

"I think GATES provided structure for students to start their work together. Some groups used it and others did not. Overall, I think GATES was positive." [AP3]

"I believe there were less issues - certainly there were no emails or requests to meet with me because of group issues or tensions."[AP4]

"Yes - very much so. The students were able to use the GATES tool to help them navigate group assignments, which can sometimes be difficult. The tool provided clear and concise guidelines for how to deal with these group assignments and anecdotal feedback from students indicated that they liked this tool as it provided a framework and accountability for each member." [AP5]

Academics were also provided with an option to provide extra comments:

"It could and should help but we need to sell it to the students that there is a benefit even if it is not tangible. Perhaps adding some extra resources such as action plans, calendars etc may encourage them to use it." [AP2]

"I think that the key learnings of GATES need to be practiced in tutorials/discussed beyond the GATES tool so that it is integrated fully into the unit. Otherwise, students can see it as an extra thing to do." [AP3]

"The GATES tool has been incredibly helpful in facilitating successful group assignments in this unit. Anecdotal feedback from students has suggested that they appreciated this tool to help provide a clear framework for each group member/group, which was lacking in their other subjects. Student feedback was positive, and the resulting assignments were of a high quality." [AP5]

Discussion

There is much in the literature presenting arguments both for and against utilising group assessment tasks in university courses (Livingstone & Lynch, 2000; Nordberg, 2008; Orr, 2010). Livingstone and Lynch (2000) argued that some of the negative perceptions around group assessment tasks have taken on a sense of 'mythology', and as such may have deterred academics from using group assessments. Six negative perceptions or myths reported by Livingstone and Lynch (2000) were: 1) 'Clever' students do not get sufficient credit for their work, 2) unequal contributions from team members unfairly affect grades, 3) lazy students can 'hide' from staff members, 4) group work slows down the learning process due to unproductive time e.g. meetings, 5) group work impacts on other work due to the extra demands on student time, and, 6) group composition unfairly affects one group over another e.g. skills make up, personality clashes. This research study aimed to explore both students' and academics' previous experiences with group assessment tasks and determine if the 'GATES' tool impacted on these experiences in any way through the facilitation of teamwork competencies.

The majority of students in this study reported having previously participated in group assessment tasks, either at high school, university, or both. They reported both positive and negative experiences for prior participation in group assessment tasks (beginning of semester survey) and at the end of the semester after they had completed their course's group assessment task with or without having used the 'GATES' tool. Positive comments related to team members having similar work ethics, similar quality expectations for the final submitted assessment item, delivering to agreed deadlines, turning up to meetings, and keeping lines of communication open. Negative comments related to group members who behaved poorly, were hitchhikers, had differing aspirations regarding grades, and who increased the stress levels of other group members who were aiming for a high mark. There were also comments regarding the time wastage and inefficiency with group assessment tasks compared with individual assessment tasks. Students were particularly negative if the hitchhikers received the same mark as the rest of the group members who did all the work. Also, a higher proportion of students who had previous negative experiences with group assessment tasks reported that group assessments are not a fair and effective way to examine their knowledge. These findings provide evidence that the 'myths' reported by Livingstone and Lynch (2000) are in fact 'real' experiences. Students need support to manage the group work process.

In this study, a larger proportion of CALD students reported positive experiences with group assessment tasks compared with non-CALD students. This is perhaps because, within a group, individual members can discuss ideas and problems, there is a sense of peer support, and there is a shared responsibility for the assessment mark. CALD students can face difficulties in their studies with barriers identified as poor English language communication skills (reading, writing, and verbal communication skills), lack of confidence to ask questions

and approach academic staff, and loneliness and social isolation (Amaro et al., 2006; Boughton et al., 2010; Davidhizar & Shearer, 2005; Gardner, 2005; Jeon & Chenoweth, 2007; Matters et al., 2004). Many of the CALD students in this study reported the social aspects of the group assessment as a positive experience, with some commenting they made new friends. It has also been identified that CALD students require a higher level of learning support compared with their non-CALD peers (Boughton et al., 2010). It is therefore perhaps unsurprising that in this study there was a higher proportion of CALD students compared with non-CALD students in favour of resources being available to students to support them in the group assessment process.

In the end-of-semester survey, similar numbers of students in the 'GATES' group and the non-'GATES' group still reported negative group experiences due to hitchhikers. One student commented that this was no reflection on 'GATES' because no tool can fix hitchhikers in a group. This study corroborated the findings of other researchers (Nordberg, 2008; Sharp, 2006) that students participating in group assessment tasks are concerned about hitchhikers. As in other studies (Nordberg, 2008; Orr, 2010; Sharp, 2006) this concern with hitchhikers was associated with perceptions of fairness of the assessment task in assessing individual group members' knowledge. Understanding students' perceptions of fairness is critical (Orr, 2010) as these perceptions of fairness are often about being treated consistently (Stowell, 2004). Fairness may be understood by students to be about how individual group members are marked e.g. all members receiving the same mark, or being marked for individual contributions to the group process (Jaques & Salmon, 2007; Orr, 2010). In this study, GATE 4 (*Situation monitoring* and *Mutual support*), was perceived by students to be not particularly helpful in managing group issues. This highlighted that the 'GATES' tool requires more student support resources in GATE 4 to assist students with conflict resolution and negotiation skills to manage difficult conversations with group members who are hitchhikers, or who have strong personalities. Therefore, this GATE will undergo an extensive review to identify extra resources which might be added to assist with conflict resolution. In addition, a peer-reflection marking tool or peer-marking tool may be needed to increase students' sense of fairness with the group process (Lejk & Wyvill, 2002).

The low uptake of the 'GATES' tool in this study was disappointing. However, of the students who did use it, over half found it helpful – more so in the early planning stages of the assessment task with many students commenting that 'GATES' assisted their team in starting the assessment early. Anecdotally, many students commented to academic staff that the tool itself was visually appealing and user-friendly. Some students reported that the wiki page was an annoying, extra thing they had to do, and the wiki page itself was clumsy to use. Therefore, future development of GATES will remove the use of wiki pages. In response to the negative student comments regarding team meetings and time management, the next iteration of 'GATES' is planned to include a calendar function in GATE 3, as well as a timeline tool to make it easier for students to create their action plan.

The five academic course coordinators reported previous negative experiences with group assessment tasks. However, they continue using this assessment form because they realise the importance of real-world, authentic group tasks in helping students develop teamwork competencies necessary for their future careers in multidisciplinary healthcare teams. 'GATES' was well received by the five participating academics with some reporting that they did not feel students fully appreciated the support the tool provided. The academics reported that 'GATES' got students working on their assessment task quickly and helped with groups' organising and planning which they believed was a good predictor of academic success.

Conclusion

In this small research study, the aim was to explore both students' and academics' previous experiences with group assessment tasks and determine if the 'GATES' tool impacted on these experiences in any way through the facilitation of teamwork competencies. The key findings were that firstly, a higher proportion of CALD students compared with non-CALD students favoured using resources such as the GATES tool to help them complete group assessment tasks. The second key finding was that GATE 4 (Progress Monitoring) did not provide adequate resources and support to help students deal with hitchhikers, domineering team members, and the other team issues often reported in the literature. We believe there is a place for the 'GATES' tool in supporting students across the group assessment task process. However, this study's findings indicate the GATES tool needs refining and will inform the development of the next iteration of 'GATES'. The next iteration of GATES will be studied in a broader context to address the limitations of the current study including: the scale of the exercise, confinement to one university, and limited response rates. Further research is also warranted in exploring CALD students' experiences with group assessment tasks and the types of support that will assist their learning experiences and outcomes.

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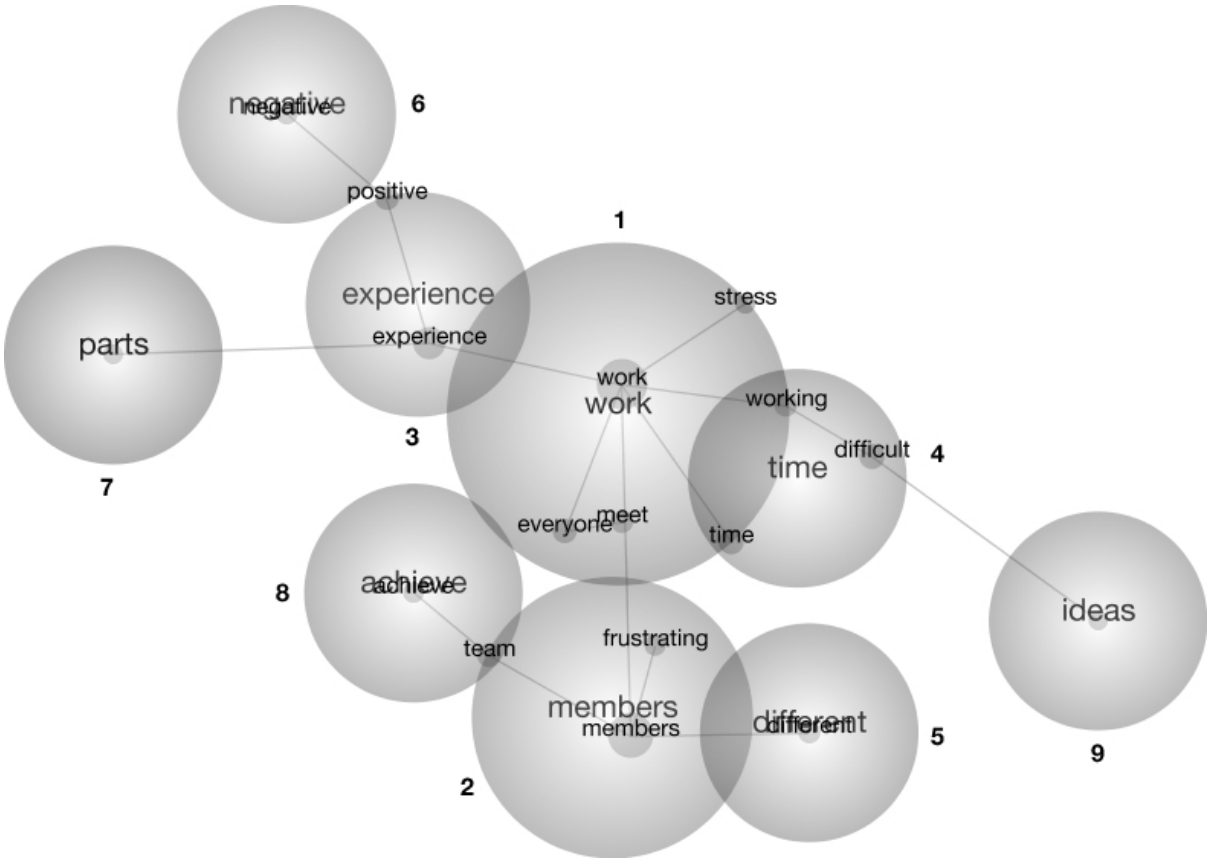

Fig. I: Leximancer Concept Map of Participants' Previous Experiences of Group Assessment Tasks (Circles are numbered in order of importance with '1' being the most important)

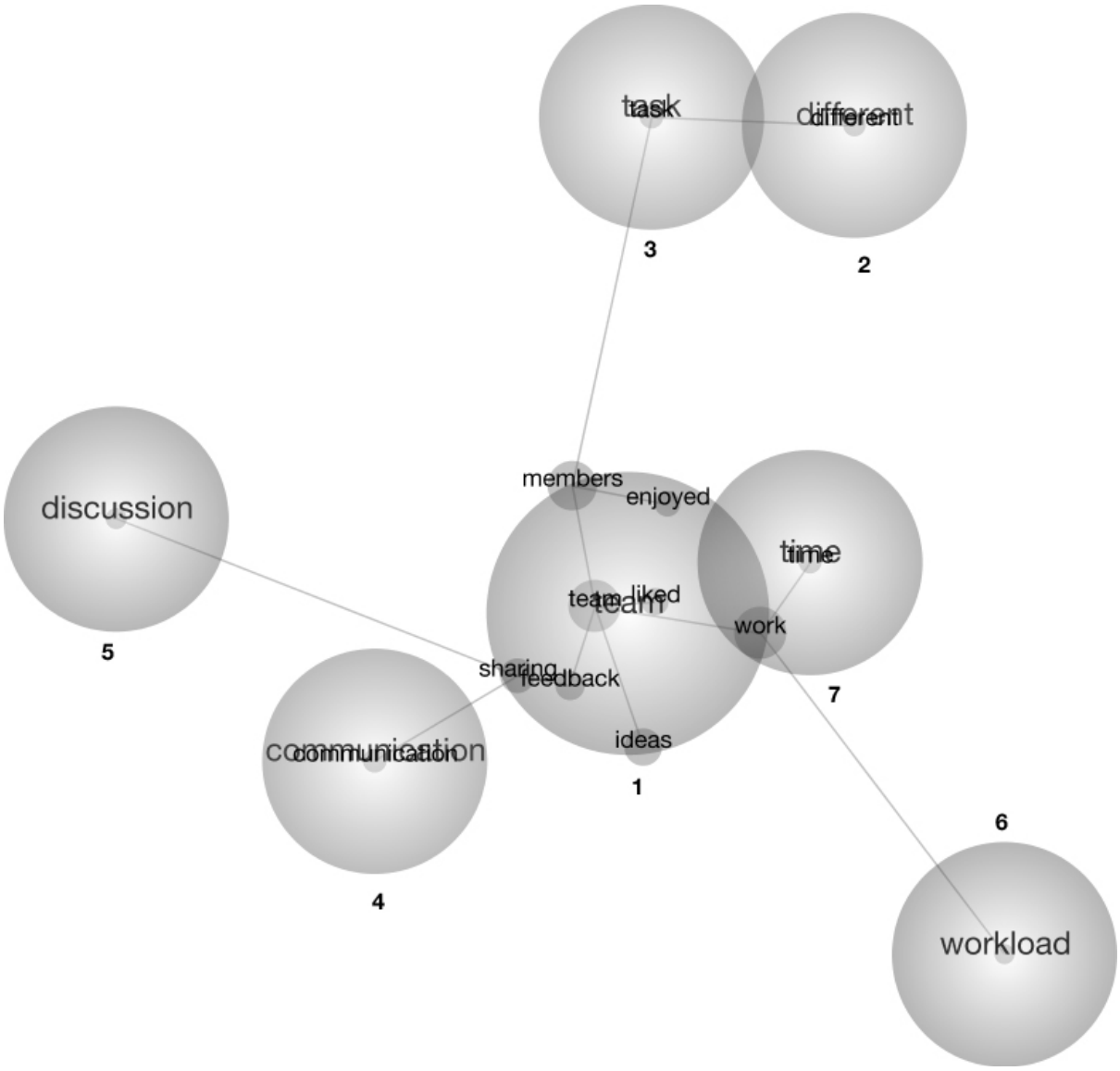

Fig. II: Leximancer® Concept Map of Students' Positive Experiences with this Semester's Group Assessment Task (Circles are numbered in order of importance with '1' being the most important)

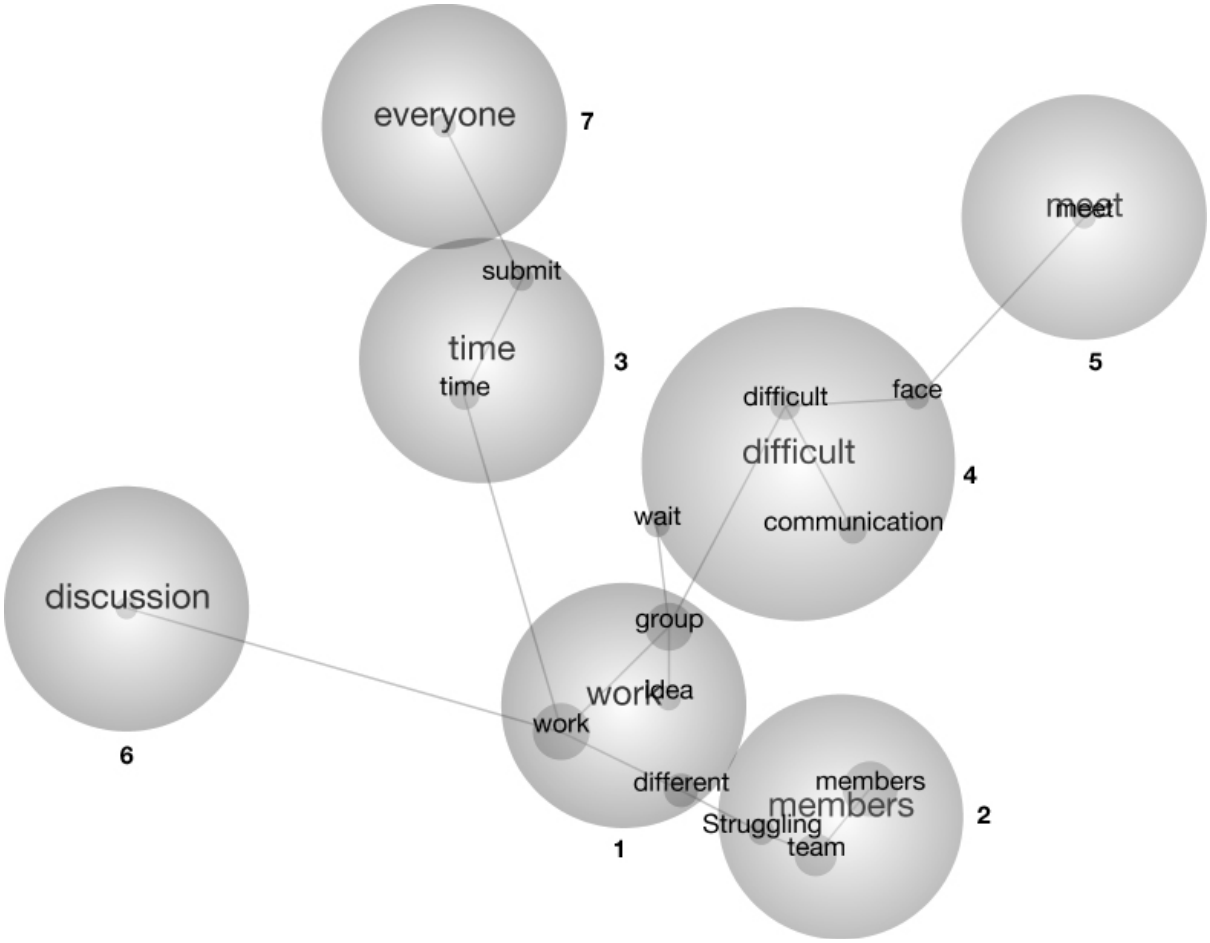

Fig. III: Leximancer® Concept Map of Students' Negative Experiences with this Semester's Group Assessment Task (Circles are numbered in order of importance with '1' being the most important)

Tables

Table 1 Age Range and CALD Status (CALD = English not first language) of Student Participants in First Questionnaire

Age Range	CALD - No	CALD - Yes	Total
≤ 20 years	64	8	**72**
21 – 30 years	42	34	**76**
31 – 40 years	17	7	**34**
41 – 50 years	9	1	**10**
≥ 50 years	5	0	**5**
Total	**137**	**50**	**187**

Table 2 Age Range and CALD Status (CALD = English not first language) of Student Participants in Second Questionnaire

Age Range	CALD - No	CALD - Yes	Total
≤ 20 years	6	29	**35**
21 – 30 years	12	30	**42**
31 – 40 years	14	7	**21**
41 – 50 years	0	1	**1**
≥ 50 years	1	2	**3**
Total	**33**	**69**	**102**

Table 3 Codes Generated from Manual Coding Process of Participants' Previous Experiences of Group Assessment Tasks from Beginning-of-Semester Data

Positive Themes	Negative Themes
Diverse perspectives	Communication issues
Effective planning & communication	Different quality expectations
Rewarding experience	Different skills level
Shared responsibility for group outcomes	Difficulty working with friends
Social experience	Difficulty scheduling meetings
	Hitchhiker
	Individuals receive group mark
	Stressful
	Strong personality types not open to others' opinions