

Corporate style team-building activities for undergraduate engineering programmes

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***Abstract:** Teamwork skills are among the most important skills that employers' desire to have in the engineers. This paper reports on the use of corporate style team building activities to accelerate the development and enhance the performance of multidisciplinary teams of undergraduate engineering students. The team building exercises emphasised the importance of trust, communication, planning and problem solving for effective teamwork. Majority of the students found the exercises both useful and enjoyable.*

Introduction

Ability to function effectively within a team is one of the important graduate attributes for engineers. Required by both employers and accreditation bodies (Perusich, 2007), academic institutions have resorted to embed the ability to function effectively in teams into their programme objectives and learning outcomes. Effective teamwork skills are often a manifestation of social, inter-personal, and technical characteristics. Therefore, teaching teamwork skills at undergraduate programmes is easier said than done. Effective teamwork skills include problem solving, resourcefulness, planning, communication, coordination as well as trust and accountability (Maddux and Wingfield, 2003).

Although the literature is divided on the effectiveness of team building activities in inculcating effective teamwork skills (Schneier *et al.*, 1994), teamwork skills development and team building activities continue to be an important part of the organisational development in the corporate world. Corporate dedicate a sizeable portion of development budget to team building activities.

Our school offers three undergraduate engineering degree programmes, namely, chemical engineering, electrical and electronic engineering and mechanical engineering. In order to produce graduates who are ready for employment, we adopted a project-based approach for our teaching. Every semester, students from the three engineering programmes are registered for a common "Design" module to work in multidisciplinary teams in order to successfully complete a given project. These modules are carefully designed to achieve an array of professional learning outcome including the ability to work effectively in a team.

This paper reports on the use of a corporate style team building activities at the beginning of the first semester in order to jump start the team performance. The effectiveness of these activities is assessed through questionnaires that the students have to answer.

Module Delivery

Engineering Design and Communication module is offered to all the first year, first semester students. The module aims at introducing the design process, resources planning, the Tuckman's team stages model (Tuckman, 1956), effective communication and presentation skills and other necessary professional skills in an engaging and enjoyable manner. This is done through a series of short lectures and through project work that is conducted multidisciplinary teams of 5-6 students each. At the end of the semester, students need to present their projects at the Engineering Fair. The students are

continuously assessed based on the quality of their project outcome, presentation, report writing, peer evaluation and an evidence based portfolio that they keep to track the achievement of the module's learning outcome. Each student is assigned a mentor that (s)he needs to meet weekly to discuss various academic issues. The mentor is responsible for the verification of the evidence that supports the student's claim of achievement of a specific learning outcome.

Teams go into four main stages in their development, namely, forming, storming, norming and performing (Tuckman, 1965). This is show schematically in Fig. 1. It is essential that the team reaches the "Performing" stage where both enthusiasm as well as knowledge of the team dynamics and the project are high. Having the right teamwork skills is essential for the team to pass through the "storming" stage where both enthusiasm and knowledge are low. In order to accelerate the the team development, team building activities are organised during the second week of the semester. The activities aim at creating awareness among the students of the importance of trust, planning, communication and collaboration for a successful team. The activities comprised three main exercises

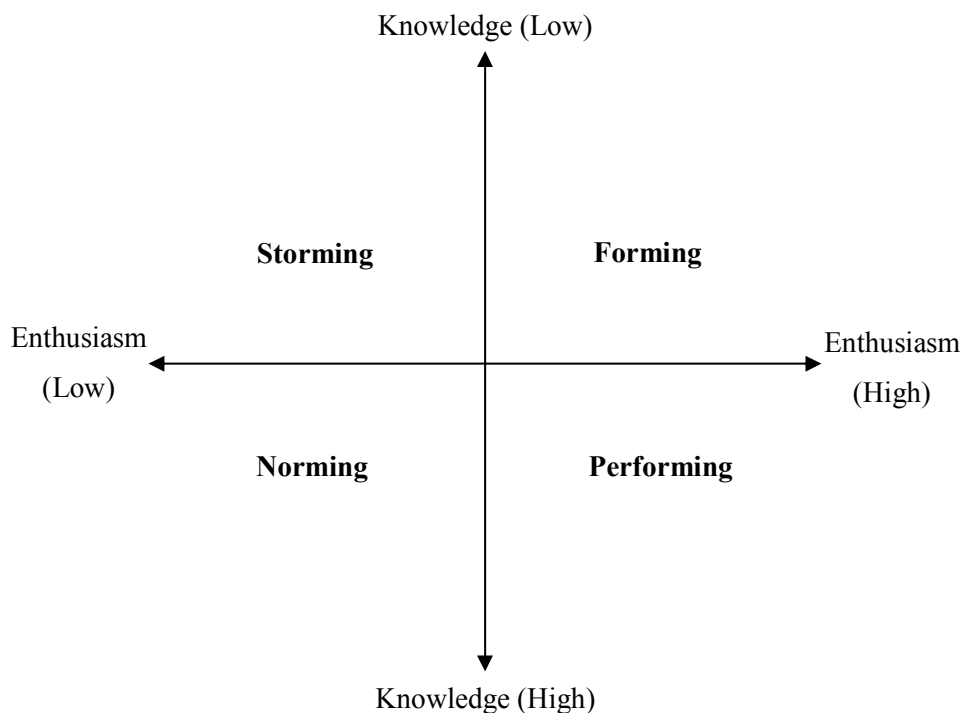


Figure 1: Schematic of the characteristics of different team development stages

1. Trust Fall: In this exercise, a team member allows himself (herself) to fall back, without bending his (her) knees, while the other team members support his (her) fall. This exercise is aimed at creating a sense of responsibility, accountability and trust among the team members. This activity is done within the project teams (5-6 students).
2. Human Pyramid: In this exercise, the students are divided into 4 big teams of 20 members each. Each team is given a task of building a human pyramid to retrieve a post-it note that was stuck on the wall at a height of 3m. This exercise required a lot of planning, coordination and communication among the team members. Figure 2 shows one of the teams attempting to build the human pyramid.
3. Acidic River: The 4 big teams are asked to imagine that they are at the bank of an "Acidic River" that is 6m wide and they need to cross the river to the other side. Each team is given four plywood boards of 15cm×25cm. These boards are "acid resistant" and the team can make them "float" on the river to cross. The problem is that none of the team has enough boards to cross. The key learning here is that the 4 teams need to switch from competition mode to collaboration mode and

learn how to share resources. This exercise requires a fair bit of problem solving and out of the box thinking. Figure 3 shows the students crossing the “Acidic River”. They normally arrive at the conclusion that they need to collaborate when they realise that it is not possible for a single team to achieve the task individually.

At the end of each of the above three exercises a debrief session is called for by the lecturers. Students were encouraged to share their reflections and key learning in order to internalise the experience.



Figure 2: Building the human pyramid



Figure 3: Crossing the “Acidic River”

Research Methodology

Participants

The participants were 84 undergraduate students (year 1) enrolled for the Engineering Design and Communication. The participants were from Chemical, Electrical & Electronic and Mechanical engineering programmes. The sample (the entire cohort of students) consisted of 61 males and 23 females, with an average age of 19.7 years (ranging from 18 to 23 years). 95% of the students were locals from Malaysia while the rest were international students.

Procedures and Measurement

After the completion of the team building exercise, the students were asked to complete a questionnaire to gauge how they perceived the exercise, how did their teams fare and how did they assess their contribution to the team. To ascertain the long term effects of the team building exercises on the team performance of the students, students were asked to comment on the usefulness of the exercise 10 weeks later (week 12 of the semester).

Results and Discussion

At the end of the team building activities, a questionnaire is served to the students to assess how they perceived the exercises. Figure 4 shows the summary of the analysis of the students' feedback. Majority of the students enjoyed the exercises and felt that they contributed positively to their respective teams. The exercises helped the majority of the students to understand the role of trust, communication and resources planning in team success as well as the importance of having the right team leader. Members of the teams that completed their tasks successfully attributed the success mainly to their ability to work together, while the lack of communication, planning and leadership were blamed for the inability of achieving the tasks' objectives. 39% of the students mentioned that they will improve planning if they were to repeat the same exercises. This was followed by 25% who chose to improve their work with other team members and 19% who opted to change the team leader.

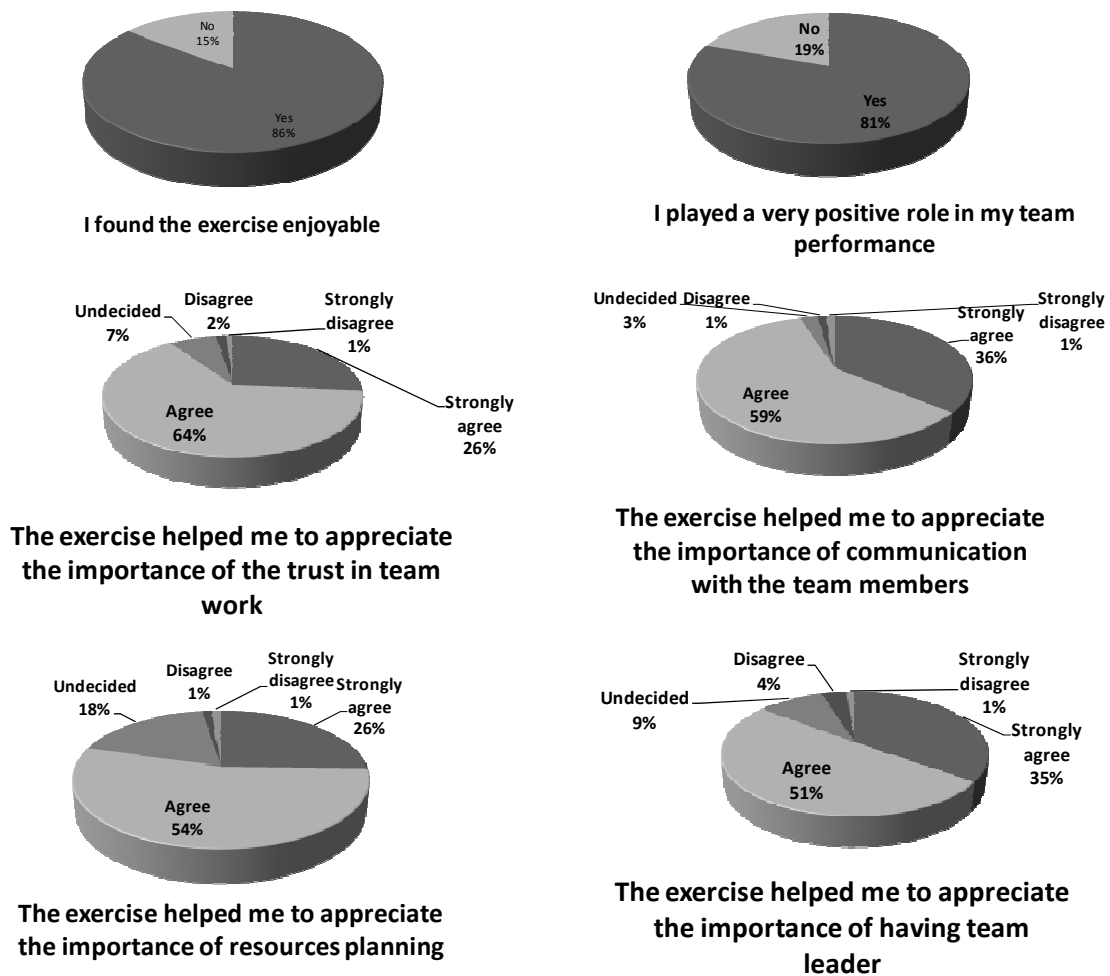


Figure 4: Analysis of students' feedback after the team building activities

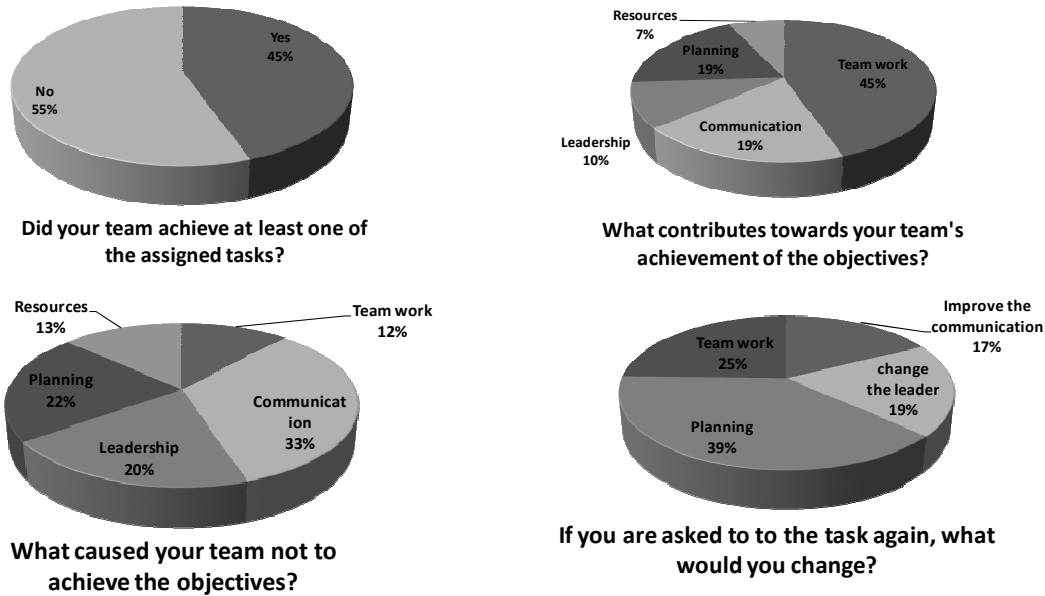


Figure 4 (continued): Analysis of students' feedback after the team building activities

A second, less extensive survey was conducted in week 12 of the semester with one question aimed at assessing how the students found the long term effects of the team building activities on their overall performance within their teams. The majority of the students agreed that the exercises had a good impact on their teamwork skills

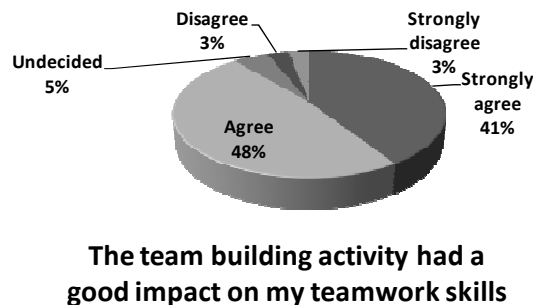


Figure 5: Analysis of students' feedback in week 12 of the semester

Conclusions

A corporate style team building activities were designed and conducted for the first year, first semester students of undergraduate engineering programmes. The activities emphasised the importance of trust, communication, planning and problem solving for effective teamwork. Majority of the students found the activities to be useful and enjoyable. After 10 weeks of the activities, the students reported that the activities had a good impact on their teamwork skills.

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