

A model for successful student teams

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Abstract

We are of opinion that students learn more about teams from positive team experiences than they do from negative ones, for this reason we put in every effort to maximise the chances of pleasurable team experiences. We also try to avoid as much as possible, situations in which bad team experiences can arise. Positive experiences may reduce the chances of interpersonal conflict in teams and will create a more conducive learning environment. We strive to facilitate the formation of teams that are more likely to succeed. We endeavour to minimise social loafing and heroism.

Introduction

The aims of our course are achieved mainly through teamwork because "Teams promote *esprit de corps* through joint planning, peer tutoring and coaching, and shared decision making and problem solving. Work done in isolation falls short of those achievements possible through group efforts. " (Weller and Hartley, 1994)

We investigated team size and selection methods. The norm for student team size appears to be set at five members and that the method of team formation widely varies. Enhancing students' awareness of their personal styles is advocated. It is also recognised that students with similar academic abilities are likely to be challenged in accordance with their abilities, thereby providing the potential for equal contributions from all team members.

The phenomena of "social loafing" and "heroism" are identified. "Social loafing" occurs when students slack in respect of contributions to the team tasks and "heroism" arises when single team members dominate and take over tasks. These phenomena are mutually conducive.

We describe a strategy for administering teams. The positive issues raised in the literature are incorporated while the problems are avoided. Our teams are mostly self-selected, which may be the reason that, in our experience, the members in the teams usually take ownership of group problems and are able manage interpersonal conflict successfully. Self-selection of teams naturally leads to academic alignment. Methods for fostering and maintaining co-operation in teams are discussed.

Scenario

The Software Engineering module, presented in third year by the Computer Science Department of the University of Pretoria is compulsory for Computer Science majors. Among various goals, the module aims to facilitate the learning of skills necessary to perform effectively in a team environment. Our students work in teams on a project that lasts the whole year. Teamwork and team dynamics are mostly learnt through experiential learning.

We decided draw from the recommendations found in the literature to design a model to present teamwork that incorporates lessons learnt by other educators.

Method of team selection

Bacon et al. (1999) report three possible approaches to assigning students to teams have namely self-selection, random assignment, and lecturer assignment.

Random selection seems to be generally a bad idea. It gives all students the same random chance of being assigned to a well formed, or to a dysfunctional team. Addison (2005) mentions that, at Wits, team members have been determined by academic staff for several years and that some of their students expressed their approval of not letting students choose their own teams. Bacon et al. (1999) however report that criteria can differ widely and thus is seldom used. In our previous experience we observed a tendency for students who were assigned to teams, to blame the system when interpersonal conflict arose, rather than taking ownership and solving such problems themselves.

An advantage of self-selection is that it may offer higher initial cohesion, which can help these teams to become productive more quickly (Bacon et al, 1999). They caution that self-selected teams tend to be overly homogeneous and may also possess an inadequate skills set.

Team size

An investigation into what is considered the norm for team size reveals that most authors seem to be in favour of small teams. Putnam and Myers (1998) investigated the productivity of teams of different sizes and found a significant drop in performance when the team size exceeds eight people. Koch (2003) remarks "*When working with six other people you can (barely) keep track of who's doing what and what you yourself can do to help him or her*" and urges practitioners to keep teams smaller.

In a study by Boehm et al (1998) where the goal was to evaluate the feasibility of using the WinWin spiral model to build applications written by graduate student teams, Boehm experienced that teams with five members were more efficient than teams with six members because having fewer members that had to communicate with one another, reduced inconsistencies in deliverables and also reduced additional activities required for efficient teamwork.

We consider a team size of five to be optimal for our situation. Many of the problems associated with too many team members are obviated. Teams of five members still provide for the generation of enough conflict to challenge the students sufficiently to acquire the necessary interpersonal skills required for the team-building aspects of the course.

Personality diversity

Belbin (1981) identified team structures in terms of team roles. An even spread of the roles identified by Belbin is required for successful teams. Hunt and Beaty (1995) report that students, in general seem to accept that teams with a balanced diversity of Belbin types would be effective.

Gorla and Lam (2004), using the Kiersey Temperament Sorter (Keirse & Bates, 1984) identified ideal personality types for three team roles in software engineering teams (team leader, systems analyst, and programmer) and concluded that the presence of the identified personality types in each of the roles impacts positively on team success. They also linked team performance to the heterogeneity of personality dimensions identified between team leader and the rest of the team.

In accordance with recommendations by Hunt and Beaty (1995) we are in favour of having teams where personality diversity and correct team role allocation is applied, but not to the extent that we feel that we should intervene if students prefer to disregard the research that has shown the benefits thereof. In our experience attempts to control the formation of teams where personality preferences are seriously considered, the students tended to buck the system by lying about the outcome of the tests they complete for this purpose.

Alignment of academic goals

In cases reported in the literature, the objective for forming teams with balanced academic abilities is mainly to level the playing field for all students (Nelson & Bass 1994). Addison (2005) pointed out some benefits of having student teams where the members' academic ability covers a wide range. Smith et. al. (2001) however noted that if the academic goals of team members are not aligned, this can result in extreme conflict. Similar to Smith et al, we have observed that the more able students get frustrated by the inability of some the team members to contribute in accordance with their expectations. We consider healthy teamwork and the minimization of conflict in teams acquired through in-team academic uniformity more advantageous than inter-team balance.

Social Loafing

In laboratory settings, researchers have often observed that individuals tend to reduce their effort when working in a team, a phenomenon referred to as social loafing (Ingham et al, 1974). A social loafer does not really learn or practice the *technical skills* required for the task involved and takes credit for work that others have done (Smith, 2004).

Hunt and Beaty (1995) report an incident where it was revealed by the team members that they had been acting in a way that harmed the overall team performance to safeguard members in their team from failing. Afterwards the students who saved their fellow students felt cheated and those who were saved felt guilty because they owed their 'stay on the course' to the sacrifice of the other group member's overall marks. Smith (2004) suspects that students generally accept certain levels of social loafing.

In our experience other reasons for not contributing can include emotional and personal issues as well as an inability to complete tasks due to a lack of interest, motivation, knowledge or skills. It is not always clear why students are willing to carry the weaker team members.

Heroism

Pfaff and Haddleston (2003) recognised a team problem of a "leader" who takes over and works independently, discouraging the participation of other team members. We are also concerned about this phenomenon, which is the opposite of social loafing. An individual increases her effort and willingly works on her own to complete her and other members tasks in an effort to "save the project". We call such a student a hero. A hero does not really learn or practice the *social skills* required to complete a project of this kind, and denies her team mates the opportunity to learn the *technical skills* or gain the technical experience she already has.

Heroes have the tendency to demoralise the other members of the team. They are usually not open to suggestions. Because of their perfectionist natures, they are reluctant to delegate work because they think that others will not be able to do the work to the required standard. They also lack the skill to appreciate work done by someone else. They will simply reject and redo it. A student whose work is not valued can easily lose interest and even get depressed.

Healthy Collaboration

Both social loafing and heroism should be minimised. We have observed that social loafing inflames heroism and that heroism easily provokes social loafing. In many cases it is not clear which behaviour occurred first. The ideal is to encourage social loafers to participate adequately in the team and enjoy the reward of appreciation. A hero must be persuaded not to take technical perfection so seriously and to pay a little more attention to the social skills needed to keep the whole team involved and motivated.

Our Team Model

In this section we describe the rules we apply in the presentation of the course. These rules are intended to guide the students to willingly form teams as close as possible to what we consider the ideal.

Formation of teams

Team size

Teams should ideally have five members, but students are allowed to have four or six members in the team. Teams of five are unconditionally accepted while teams of four are burdened with the additional task of being involved in the interviewing of students that are not in teams. Teams of six can only be formed after initial registration.

Academic alignment

Students are invited to form their own teams. As a consequence, the students form homogenous teams in respect of academic skills and goals. The team members in these teams are challenged in accordance with their abilities.

Adequate skills set

Students choose their project to suit their skills and ability to learn new skills. This approach avoids the possibility of having an inadequate skills set in the team.

Personality diversity

We sensitise the students to the benefits of having personality diversity in the team and further rely on them to incorporate this knowledge in their experience of teamwork. This is in accordance with Hunt and Beaty (1995) who maintain that raising student's awareness is fundamental to learning the concepts concerning preferred approaches. The students are provided with tools to identify personality diversity within the teams. They are at liberty to use these to improve team composition in terms of diversity, but are not forced to do so.

Fostering and Maintaining Cooperation

The key to resolving dissension in teams is its early identification and proper counselling. We incorporate the following measures to assist us in the identification of disagreement in the teams:

- We encourage students to voice their frustrations on the discussion board or via e-mail to the lecturers.
- We make use of peer evaluations, which are conducted at regular intervals in the course of the module.
- We provide a means to expel a member from a team as well as means for a member to abscond her team.

In the following section we elaborate on these strategies.

Self reporting by students

Students are very reluctant to admit to problems and are in general extremely loyal towards their team mates. In our experience it is only cases where students can stay anonymous where students are willing to voice their frustrations, and that happens only in rare cases. None the less, they provided with general advice, which might help them and other students with similar problems.

Peer Evaluations

Peer evaluations are conducted at regular intervals. Students have to answer questions about common problems. This creates an opportunity for the students to reflect on these problems. Using a percentage scale, they must indicate the contribution of each member. They also have the option of indicating how the marks should be distributed regardless of the individual effort by the members. Students are encouraged to tell the truth about their individual contributions since it need not have an impact on their marks. If some students call for an uneven distribution of marks the team must reach consensus on the distribution of their marks during a meeting with the lecturer.

Removing a team member

In a study by Strong and Anderson (1990) regarding student opinions about free riding, students indicated the option to remove a team member, or the option to leave a team has a significant impact on the reduction of free riding. It is our opinion that these options can minimise both social loafing and heroism.

It is not fair that heroes should work on behalf of social loafers. Therefore, students are encouraged not to tolerate such behaviour. Procedures to ask a member to leave or to leave voluntarily are laid down. The fact that it is possible to be removed is, in many cases, enough of an incentive for a social loafer to pull her weight. Mismanagement often leads to frustration and dissatisfaction. Members who feel demoralised, oppressed or cheated may leave a team. The fact that it is possible for a member to resign from a team and render the team defunct, may be an incentive for a manager to be more sensitive or for a hero to let go. When a team manager starts the procedure to remove a member, or a member files a request to resign, the lecturer starts with counselling. In many cases the problem is resolved long before the procedure is pulled through.

Administrative consequences

Vacancies

After initial registration of teams, vacancies in teams are identified. All teams with only four members are required complete the additional task of advertising a vacancy and to conduct interviews from time to time. Teams, who would like to have six members, simply select a team member that will initially not be considered part of the team when they first register the team, and advertise the vacancy reflecting the attributes and skills of the sixth member.

Advertisement

A vacancy is advertised by e-mailing the advertisement to the lecturer who publishes it on the course website. Teams can identify gaps in terms of specific knowledge or skills needed for the successful completion of their project. These requirements should be reflected in the advertisement. Information regarding the Belbin team roles and Keirse personality types of the current team members can also be used to determine the attributes that are needed for better balance in the team.

Applications

Any individual may apply for a vacancy at any time by sending an e-mail to the team manager and a copy to the lecturer. The sixth member may apply for the vacancy and get appointed as soon as the prerequisites for appointment are complied with. Teams who wish to have an additional member must advertise.

Interviews

Teams who have advertised are obliged to schedule interviews for all applicants regardless of whether they are really interested in appointing the candidate or not. The interviews must be scheduled with the lecturer. Once a member has been appointed, the advertised vacancy is deleted from the course website. During an interview the candidate is expected to use the opportunity to market her strengths in order to win a place in the team. The members of the team get the opportunity to practice summarising their project and to explain technical issues relating to the project. This is an essential skill required for their demonstrations during the year and for the public project fair at the end of the year. The opportunity to practice these skills on a peer can build their confidence in preparation for presentations under more stressful situations.

Appointment of candidates

A vacancy may only be filled after the team has conducted a minimum of three interviews. The following steps are used to fill a vacancy:

1. The team manager offers the candidate the position via e-mail. The offer must be copied to the lecturer.
2. The candidate accepts the offer via e-mail. The acceptance is copied to the lecturer.

At all times a team retains the option not to fill the vacancy. If a team has interviewed a candidate and wishes not to appoint her, the manager must inform the candidate about the

decision in an e-mail message, and copy the decision to the lecturer. A candidate may accept an offer only after she has participated in at least three interviews. An offer is accepted or rejected by sending a reply to the e-mail received from the team manager and copied to the lecturer. At all times the candidate has the right to refuse an offer.

Individuals not in teams

There are many reasons why there will be times when students will find themselves to be without a team. At the beginning of the year some of the students initially fail to join teams. Also, removals and resignations result in no longer belonging to a team. Furthermore some students deregister for the module in the middle of the year. These can also result in the member count of a team dropping below four. In such cases the team is considered disintegrated.

Although students not in teams may apply for vacancies, the number of vacancies is limited. Therefore there has to be a mechanism to accommodate students in the course while they are not in teams. For this purpose two projects are run under the supervision of two outstanding teaching assistants. The one requires fairly straight forward design and implementation skills, while the other includes challenges of a technical nature. Depending on the academic competency of the student, tasks from one of these projects are given to her to complete. By completing a task the student can earn marks while waiting to become a member of a team again.

Conclusion

We observed the following trends:

- Owing to the longevity of the module, (a year) as well as the serious nature of the module and the weight allocated to teamwork various issues arose.
- Some of the issues that arose for the students were that they discovered the real nature of their friends, which lead to severe uneasiness in the teams, also severe conflict arose more often in teams where a student was appointed in a vacancy without proper investigation either from the side of the candidate or from the team. However, conflict was not limited to such cases.
- Students who do not join teams or whose teams disintegrated did not learn all the social skills intended, however they were deemed to acquire certain skills by virtue of their exposure to interviews.

- The stress levels of the students who worked in successful teams were generally lower than those of other students by virtue of the collaboration in and delegation of tasks thus leading to an equal work load.
- The mechanisms to identify potential problems and to solve existing ones facilitated improved co-operation and collaboration among team members.

Overall we maintain that our model is beneficial. Students are more committed to working together and resolving conflict because they select their own teams. The fact that students can move out or be removed from a team relieves unnecessary stress and helps to motivate them to collaborate better. It also leads to the early identification of problems. Problems are also identified through peer evaluation. Having multiple mechanisms for problem identification leads to their quick and efficient resolution.

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