

Academic alignment to reduce the presence of “social loafers” and “diligent isolates” in student teams

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The acquisition of effective teamwork skills is crucial in all disciplines. Using an interpretive approach, this study investigates collaboration and co-operation in teams of software engineering students. Teams whose members were both homogeneous and heterogeneous in terms of their members' academic abilities, skills and goals were identified and compared. We describe the occurrence of “social loafing”, a well-reported phenomenon, in these teams. We also observed a phenomenon which we termed “diligent isolation.” Our assumption was that both of these can cause team dysfunction. Additional causes which became apparent during the research are mentioned. The article includes suggestions for improving team functionality.

Keywords: Social loafing, Diligent isolates, Teamwork, Team formation, Academic alignment, Student teams.

Introduction

Equipping students with effective teamwork skills is crucial in all disciplines. Consequently, many software engineering programmes include team projects (Drake et al., 2006). However, teams often flounder. A recurring problem is what has been termed ‘social loafing’.

Much research has been done on this. Latané et al. (1979) coined the term, and reported several laboratory studies containing evidence that individuals tend to reduce effort when working in groups. The original meaning of the term implies that all team members will equally reduce effort when working together. However, in educational circles the term is increasingly used to refer to individuals within a team who slack more than do others. The literature on social loafing in the latter sense recognises its existence, investigates its causes and consequences, and proposes techniques to alleviate it. Karau and Williams (1995) refer to “dispensability of effort” as a reason for social loafing, with individuals withdrawing effort when they perceive their inputs to be redundant. Price et al. (2006) integrate this into a composite model of factors affecting social loafing.

Oakley et al. (2007) observed a “lower frequency of reported slackers on self selected teams”. Thus, it is possible that one of the consequences of self-selection may be a reduction in social loafing within teams. A consequence of self-selection appears to be that students with similar academic abilities form teams.

When thinking about problematic student teams we often encountered academic disparity. We suspected that there is a relationship between the academic profile of the team members and the functionality of the team.

This article is about teamwork in a software engineering module at the University of Pretoria, South Africa. We describe the context in which the research was undertaken, and clarify the terminology used. We investigate the relationship between the presence of diligent isolates and social loafers and the academic alignment of the team members. We also explore the occurrence of conflict in the teams. We describe the methodology used to obtain the data, and discuss and reflect on the findings. Our intuition was that teams with members who are academically diverse are likely to have social loafers and diligent isolates, and that social loafing and diligent isolation lead to each other. We incorrectly assumed that such teams would experience more conflict than those whose members are academically aligned. Our findings reveal that management skills are a more significant factor in effective teamwork than academic alignment and that conflict is less of a problem than we expected.

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Clarification of Terms

Social Loafing

In laboratory studies, researchers have observed that individuals tend to reduce their effort when working in a team, a phenomenon referred to as ‘social loafing’ (Latané et al., 1979, Ingham et al., 1974). In educational settings, the term is increasingly used to refer to individuals whose contribution is perceived to be inferior to that of others in the team. It is also referred to as ‘slacking’ or ‘free-riding’. A social loafer works less diligently in a team environment (Trytten, 2005), and therefore does not learn or practice the technical skills required for the task involved. He or she takes credit for work that others have done (Smith et al., 2001).

Hunt and Beaty (1995) report an incident where it was revealed by team members that, to protect some members from failing, they had been acting in a way that harmed the overall team performance. The students who saved their fellow students subsequently felt cheated, and those who were saved felt guilty because they owed their ‘stay on the module’ to the sacrifice of the other group members’ grades.

Diligent Isolates

The literature recognises the existence of social loafers but there is little or no acknowledgement of those at the opposite extreme to social loafing. It is recognised that teams include individualistic members but this is not often seen as problematic for the functioning of the team. As there is no consistent term to describe the converse of social loafing, we devised the term ‘diligent isolate’.

Pfaff and Huddleston (2003) recognised the team problem presented by a ‘leader’ who takes over and works independently, discouraging the participation of other members. Smarkusky et al. (2005) refer to these students as ‘poor drivers’. Feldman Barr et al. (2005) also identify a ‘lone wolf’ who impacts negatively on the team performance: “[t]he lone wolf is an individual who prefers to work alone, dislikes group process, sees others as ineffective and incapable and dismisses the ideas of others” (Feldman Barr et al., 2005). However, none of these completely describes the phenomenon we observed.

A diligent isolate is an individual who increases his or her effort and willingly works alone not only to complete his or her own tasks but also, in an effort to ‘save the project’, on the tasks of other members. He or she does not know how to delegate, and does not learn or practice the social skills required to complete a project of this kind. He or she also denies team-mates the opportunity to acquire technical skills or experience.

Academic Alignment

We established the need for a term to describe a team where the members are homogenous in terms of academic abilities, skills and goals. Owing to the absence of such a term in the literature, we use ‘academic alignment’ for this purpose. When teams are formed with inter-team balance in respect of academic abilities, the in-team academic abilities are often unaligned. In cases described in the literature, the reason for forming teams with a balance of inter-team academic abilities is to level the playing field for all students. Smith et al. (2001) observed that if the academic goals of team members are not aligned, the result can be extreme conflict. Our observations accord with those of Smith et al. (2001), who found that more able students tend to become frustrated by the inability of some team members to contribute in accordance with their expectations. McKinney and Denton (2005) also refer to problems experienced by teams with unbalanced skills.

Scenario

The Software Engineering (SE) module is compulsory for Computer Science majors in the Computer Science Department of the University of Pretoria. This third year module was presented by the first author to 102

students, working in twenty-one teams on a project lasting the whole year. Six teams had four members and three had six. The remaining twelve teams had five members each. The teams had to design and implement a software application of their own choice.

One of the aims of the module was to facilitate the learning of skills needed to perform effectively in teams. Our teaching approach relied heavily on creating and maintaining an environment in which students find working in teams as pleasurable and attractive as possible. We did this as we had found that when teams fail to function well, the students involved often become negative about the value of teamwork. Conversely, when teams succeed, the experience is highly motivating. Their success may encourage them to collaborate further and this can in turn improve their teamwork skills.

Method of team selection

Bacon et al. (1999) report three possible approaches to assigning students to teams: self-selection, random assignment and lecturer assignment. Random assignment means that all teams have an equal chance of being dysfunctional. According to these authors, this is “just as unfair as randomly assigning grades”.

Drake et al. (2006) compared feedback from students in self-selected teams with that of students placed in teams by the lecturer. They found the latter more positive. Oakley et al. (2004) strongly support the principle that teams be carefully chosen by the instructor: “In well-functioning diverse groups, the weak students get the benefit of seeing how good students approach assignments and they may also get some individual tutoring, while the strong students who do the tutoring may benefit even more.”

Bacon et al. (1999) report that criteria for assigning students to teams can differ widely, consequently they seldom use lecturer assignment. Mello (cited by Bacon et al. (1999)) reports that self-selection may encourage students to take more ownership of group problems.

Bacon et al. (1999) point out that self-selection may offer higher initial cohesion which can help teams to become productive more quickly. They caution that self-selected teams tend to be overly homogeneous and to possess an inadequate skills set. Drake et al. (2006) also report the lack of variation of styles and skills in self-selected teams. McKinney and Denton (2005) as well as Oakley et al. (2004) observe that, when students are allowed to form their own teams, the more experienced or confident students tend to form teams as do the less experienced.

Teamwork

Our students were invited to form their own teams. We facilitated the learning of teamwork skills in an informal way. We expected the students always to work as members of their teams but we did not closely supervise them. The aim was that the students should gain through experience, the skills to perform effectively in teams. We were aware that students are not always able to learn merely by their own experience and need guidance in interpreting it and in learning from their mistakes. Drake et al. (2006) report that students learn a great deal by observing how another team experiences difficulties as well as by reflecting on themselves as individuals within a team environment.

Early in the module, we presented two fifty-minute lectures in which students were informed about team composition, team growth, team roles, project management, management styles and conflict management. This gave them a frame of reference which they could use throughout the module. We also supported the teams through regular team meetings, and incorporated measures to assist us in identifying dissent. These included compulsory and regular anonymous peer rating, and systems for *ad hoc* reporting of dissatisfaction. We recognised that most teams experience conflict from time to time, and that students learn to manage it through experience. When we considered it necessary, we intervened and assisted teams struggling to resolve their conflict.

Research method and design

Paradigm

The purpose of the research was to investigate the relationship between the presence of diligent isolates and social loafers and the academic alignment of the team members; and to explore the incidence of conflict in the teams. The research was conducted within the interpretive paradigm. In this, knowledge is created by understanding phenomena through the meanings that people give to them. Therefore, it is important to stay true as far as possible to the meanings assigned by the participants. Thus the aim was not to derive statistically meaningful results that would corroborate the hypothesis that social loafing and diligent isolation are less likely to occur in academically aligned teams. Rather, we wanted to understand more about *how* and *why* these phenomena occur. Within the interpretive paradigm, the researcher accepts that no science is completely objective and that any phenomenon can have different, and sometimes diverse, interpretations rather than one 'truth'. The interpretation given by the researcher is only one of many. Personal bias cannot be removed entirely. According to Henning et al. (2004), all theory is revisable and observation is fallible. However, while we recognised that we could not be entirely objective we made every effort to avoid super-imposing our meanings on those of the students.

Credibility

The first author has taught software engineering and managed student software engineering teams for the past three years. When managing the teams, she has had a considerable amount of informal contact with the students, assisting them in team creation and project selection. She has met with them regularly in team meetings and during assessed progress reporting sessions. Therefore, she has developed a close relationship with most of the students. The second author, who played a major role in the research, was not involved in managing the teams. The fact that when the data was gathered she had no knowledge of the history, experiences and performance of the teams, and did not know the individuals involved, minimised the likelihood of prejudice in the data gathering process.

Data gathering

Class tests, which examined familiarity with lectured material, were carried out at regular intervals during the module. The results were used to express students' competence with regard to the knowledge and skills required for the module. Grades were expressed as a value between 0 and 33. A student passed the module if his or her class test grade was 13.2 or above and his or her overall grade was 50 or more. The overall grade was calculated by adding the team project grade out of 67 to the class test grade. We used the class test grades to quantify academic alignment in teams. We deem class grade to be the best measure of academic ability in our situation. Owing to the diverse prior experiences of the students, no other uniform measure was available. The standard deviation (SD) of the average grades that the members achieved in class tests was used as a measure of the academic alignment within a team.

A number of demonstrations, showing the progress and quality of the students' projects, took place during the year. Directly after each demonstration, team members rated one another anonymously on their contributions to the team effort. These ratings provided insight into team dynamics.

Ten to twelve weeks after completion of the module, we conducted semi-structured interviews with members of six teams. These teams were chosen, based on our definition of academic alignment. We selected the three most aligned and the three least aligned teams. The interviews were mainly conducted by telephone

and were recorded with the verbal permission of the interviewees. Some interviews were conducted face to face, and these were also recorded.

Our unit of analysis was a team. We interviewed team members one at a time. While one researcher conducted the interview, the other researcher listened. Notes were made during each interview. Immediately afterwards we discussed the interview, analysing from the perspective of the interviewee the roles played by the individual and by the other team members. We continued with interviews until data saturation was achieved and we had a clear picture of each team.

We familiarised ourselves with the data by repeatedly listening to and discussing the recordings of the interviews. We incorporated lecturer's observations, assessment records and peer ratings gathered during the year. We used all this information to make meaning of the team dynamics. During the drafting of the report, transcripts of key sections of the interviews were made; some of these are included in this paper.

Interpretation

Academic Alignment

In the class of 102 students, test grades ranged from 10.2 to 29.3 with an average of 19.9. The maximum test grade was 33. For each team, the SD of its members' grades was calculated. The average SD of the 21 teams was 3.51 and the median SD was 3.53. For the purpose of our study, we deem a team with a SD of less than 2 to be academically aligned and teams with a SD above 4.5 to be academically unaligned. Where friends formed teams, these tended to be aligned. At the team-forming stage, we directed students unable to find a team to join teams of our choice. In so doing, we tried to keep teams as academically aligned as possible. The most aligned team (SD 1.18) was a group of five friends. One of the members of this team said:

We all knew each other from the start and we were all pretty good friends.

The second most aligned team (SD 1.35) was formed by two friends who found other students with whom they liked to work. As one member put it:

Me and a friend of mine, we put the team together. It took quite a while but we picked the team we wanted to work with.²

Despite their careful effort, they only managed to form a team of four. Consequently, a fifth member was allocated. At first, they struggled to gel. One member said:

He was sort of forced into our team because we were expected to have a minimum of five people, but eventually it was OK.

We established that the quest for alignment was most easily relinquished where teams of more competent students happily allowed less competent students to be in their teams so that they would have the required number of members, without expecting them to contribute substantially. In contrast with Oakley et al. (2004) where they felt that the weaker students would learn from stronger students in unaligned teams, in our experience, the weaker students hardly ever seek help and the stronger students often do the work on their behalf rather than tutoring them. We observed instances where students so selected stopped contributing because their team had little or no expectation of them. It is not always clear why students are overly willing to carry the weaker team members. In an interview with a student whose team, principally due to one weaker member, was rather poorly aligned (SD 4.57), it became evident that the weaker member was eager to work but that the rest of the team were

rather success driven...we handed out scraps to this other guy, not critical programming.

² Note that most of our students are not English speaking and the quotes are verbatim

In another unaligned team (SD 5.08), two weaker members were excluded. One of them said:

the three other members made all the decisions and excluded us.

The most unaligned team (SD 7.48) was formed by two highly competent friends who opted for the correct skill and gender diversity. They built their team by inviting students with the required skills and gender to join. Their team consisted of three men with a strong coding background and two women with a strong user interface background. They claimed to have considered competence as an important criterion. One of the initial members said:

We identified people by looking at their marks on the class list and then organise interviews with them.

The team that they formed turned out to be unaligned according to our measurement. They were a team of four highly competent students and one less competent student. However, in contrast to the previous examples, they managed to incorporate the weaker member smoothly.

Conflict

Contrary to our expectations we established that conflict was not an issue. According to the students, they resolved conflicts quickly and easily. There appeared to be no clear relationship between academic alignment and conflict. We found that there were both aligned and unaligned teams with and without conflict. In one case, a team which was unaligned (SD 5.09) disintegrated completely because of conflict due to lack of leadership. In contrast, a member of an extremely unaligned team, (SD 7.48) reported that:

We were a lovely group. We were different, different weaknesses and strong points. We had unbelievable fun. We had more fun than what we worked. We worked but we also had lots of fun playing.

Surprisingly, the most academically aligned team (SD 1.35) reported conflict especially in the initial stages of the project. However, this can be traced to the fact that one member was added to the team through the intervention of the lecturer.

The other member who we did not actually agree to meet, was the last member, was directed to us.

These observations regarding conflict in teams may be skewed because we suspect that conflict is under-reported in the interviews.

Social loafing in academically aligned teams

There were no social loafers in our most aligned team, and the second most aligned team had neither social loafers nor diligent isolates. Despite the fact that they were weak in terms of the competencies required for the module, this team turned out to be very coherent and their project was successfully completed by the whole team. One of the team members said:

our project was working and we could actually see it working perfectly and we know that all contributed equally to it.

One case of social loafing was reported in a moderately aligned team (SD 1.9). One member said that one of the members slacked:

She went away on weekends and said that she cannot work, and would not be able to come back in time.

This was the only incidence of social loafing in aligned teams that we are aware of. Of all the social loafing cases that we encountered, this was the only instance where the student in question deliberately avoided responsibility. It is important to note that this team had six members. This is in accordance with the findings of Ingham et al. (1974) who established that social loafing positively correlates with group size.

Social loafing in academically unaligned teams

We observed that the worst cases of social loafing occurred in teams where weak students were excluded by the stronger members. In one team, a member was noticeably weaker than the rest. Because of this, the stronger members actively deprived him of learning opportunities. One member said:

there was a time that he ... questioned us and said “listen, what the hell is going on, why aren’t I getting any programming tasks?” We told him “listen, we don’t want to put any pressure on you ...”

In the team that disintegrated, the two weaker members were completely excluded and lost interest. One of them said:

we basically did nothing, lost interest and left.

This confirms the notion expressed by Price et al. (2006) who mention “perceived dispensability” as one of the “forces (that) may be operating to influence loafing behaviour”.

Diligent isolates in academically aligned teams

We identified a diligent isolate in our most aligned team (SD 1.18). He felt overly responsible for the success of the project. He said:

They knew that they would disappoint **me** if it wasn’t done.³

The reason for his attitude can be attributed to the fact that their system was developed for his father. He said:

My father has an electrical engineering company and he was looking for a certain project, and it just so happened that we were able to provide him with a solution.

This may have pushed him into becoming a diligent isolate.

We observed a different type of diligent isolate in a moderately aligned team (SD 1.9) with six members, where the diligent isolate took no part in the team and simply worked on the coding tasks allocated to him. More diligent isolates of this type appeared in teams who applied a ‘divide and conquer’ strategy. These members were coding experts who believed that that the code was the most important aspect of the project and that design should be adjusted to accommodate their implementation. They were unaware of any conflict or other issues within the team, and appeared rather arrogant about how their work related to the overall project. When interviewing one of the coders, it became evident that he was completely unaware of the tasks and activities of the other team members. He said:

I was involved with most of the coding of the **actual project**³.

This corroborates the argument of Oakley et al. (2004) that teams consisting of academically strong students often adopt a divide and conquer policy, and learn little about teamwork.

Diligent isolates in academically unaligned teams

The most noticeable case of diligent isolation in the study occurred in one of the unaligned teams (SD 4.73) where two members did almost all of the coding. One of these members felt very strongly that at times he and the other coder had to rescue the project. However, neither social loafers nor diligent isolates were reported in the most unaligned team (SD 7.48).

³ Our emphasis

Other factors

While academic alignment is a significant factor in teamwork, we recognise that the inability of some students to learn and apply teamwork skills effectively can also be caused by other factors.

Team size

The only incidence of deliberate social loafing of which we are aware, occurred in a team that had six members. This is in accordance with Steenkamp (2002) who cautioned that student team size should not exceed five, and Ingham et al. (1974) who established that social loafing positively correlates with group size.

Gender issues

In our investigation, we did not address gender issues at all. However, we recognise that they can influence team functionality. We suspect that there is a perception that women are less competent coders. All the diligent isolates we identified were men. We also suspect that women were often included in teams for the 'softer tasks'. For example, the team that invited students with the required skills and gender to join may have approached the women to help with interface design and to help improve the appearance of their documentation. We suspect that the women were less involved in the coding.

Management and communication skills

We observed that management played a significant role in the success of a team. In some cases, it had more effect than academic alignment. For example, one unaligned team was successful largely due to good management. The team leader said:

Teamwork was not much of a problem, I do believe it comes naturally to most folks.

His competent leadership contributed to the involvement of all members, regardless of ability. In one of the aligned teams, inappropriate management meant that tasks were simply delegated and the team never worked as a unit. Social loafers and diligent isolates were identified in this team.

Communication skills also seem to be an important factor in successful teams. Although no dissent or disagreement was reported in the interviews, we observed during the year that teams that appeared to have poor communication skills fared worse than those with better communication skills.

Unfamiliar content

The content in the other modules in this degree program is mostly of a scientific or technical nature. Thus, the students expected to learn content-related facts which require attention to detail. However, teamwork needs a quite different set of skills. The theories of teamwork are mostly speculative and require a holistic and imaginative approach. In this unfamiliar terrain, students can have difficulty in adapting their learning styles. In a test where students were asked to write about a lecture on conflict management, one student wrote:

It felt to me like a B.A. lecture ...but that's the problem; we're B.Sc. students... I really felt that the lecturer advice would have been much more useful to someone who actually cared about things like that.

Social challenges

After a briefing during a lecture prior to team formation, the students were expected to complete the Keirsey Temperament Sorter (Keirsey and Bates, 1984) in their own time. They voluntarily supplied the outcome of their tests in an assignment in which they were required to discuss the composition of their newly formed teams. According to the reported results, 50% of the students were introverts. While only 25% of the general population are introverts, more technologists fall into this category and may find it difficult to work well in teams (Ferdinandi, 1998). The number of students who entered our module with an inherent inability to work effectively with other people was therefore higher than would be expected in other student populations. In an instance where the lack of ability to work in a team was apparent, the team leader was an introvert and took no interest in acquiring the management skills required for the project. Instead of making an effort to incorporate all team members, he ignored some of them and took the attitude that

if they do not ask for work, I will not give them any.

Consequently, two members left early in the year and the remaining members failed to complete their project.

Conclusion

It seems that academic alignment may be beneficial for effective teamwork. It is well known that weak alignment can cause conflict. In this study, we found that it is not poor alignment *per se* that gives rise to conflict but rather that it may create the conditions for diligent isolation and social loafing which in turn can cause conflict. Healthy teamwork and low conflict levels, acquired through in-team academic alignment, appear to be more important than inter-team balance, and self-selection is an effective way to achieve more aligned teams. We prefer homogenous teams in respect of academic skills and goals as we feel that this contributes to members being challenged in accordance with their abilities.

In our view, diligent isolation is as unacceptable as social loafing because both result in an incomplete learning experience. We recognise that social loafing and diligent isolation are inter-related. Contrary to our initial assumption, we found that this relationship is not symmetrical. It appears that a diligent isolate in a team more often causes another member to become a social loafer rather than the other way round. Diligent isolates tend to take over not because of social loafing but because they believe they are the only people who can do the job. Therefore, they may exclude team members whom they deem insufficiently competent. Social loafing tends to occur when a student feels inadequate because that is the way that the other members treat him or her. Diligent isolates often expect the team to acknowledge their superiority. In many cases, social loafing is a consequence of academic disparity. Diligent isolates were identified in some teams regardless of their academic alignment. It became apparent that diligent isolation occurred where team members *believed* that they were better coders than the others, and that coding was the most important aspect of the project. Diligent isolation only occurred around the coding component of the project. While the intention was that all members should be involved with all aspects of the project, in the teams where diligent isolates were identified the managers assigned all the coding to those members perceived to have the best coding skills. They were not involved in other tasks.

We discovered that most cases of social loafing occurred where team members were not academically aligned and the weaker members did not pull their weight. We also discovered that the social loafers in most cases were not unwilling to contribute but were denied the opportunity by their more competent team-mates. Social loafing where students deliberately chose not to contribute to the team effort was rare, although not entirely absent.

We acknowledge that many factors contribute to team success and that none of these can be ignored. One of the most significant of these is management. Proper management can have a noteworthy effect on team performance. A self-selected team of five members seems to be the ideal environment in which software engineering students can experience and learn the skills of teamwork. Because we observed that most teams

were able to resolve conflict, we believe that it is more important that students be trained in management skills than in conflict resolution. To avoid the possibility of students becoming social loafers or diligent isolates, academic disparity within teams should be avoided and perceived differences in respect of coding ability should be discovered as early as possible.

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References

- Bacon, D.R., Stewart, K.A. and Silver, W.S. 1999. Lessons from the best and worst student team experiences: how a teacher can make the difference. *Journal of Management Education*, 23:467–488.
- Drake, R. Goldsmith, G. and Strachan, R. 2006. A novel approach to teaching teamwork. *Teaching in Higher Education*, 11(1):33–46.
- Feldman Barr, T. Dixon, T.A. and Gassenheimer, J.B. 2005. Exploring the “lone wolf” phenomenon in student teams. *Journal of Marketing Education*, 27:80–91, April 2005.
- Ferdinandi, P.L. 1998. Facilitating communications. *IEEE Software*, 15:92–96, September 1998.
- Henning, E., van Rensburg, W. and Smit, B. 2004. *Finding Your Way in Qualitative Research*. Van Schaik Publishers, Pretoria, RSA.
- Hunt, P. and Beaty, L. 1995. *The impact of knowledge about aspects of personal learning style on team effectiveness*. Oxford Centre for Staff Development, Oxford, URL <http://www.city.londonmet.ac.uk/deliberations/ocsd-pubs/islass-hunt.html>.
- Ingham, A.G. Levinger, G. Graves, J. and Peckham, V. 1974. The Ringelmann effect: studies of group size and group performance. *Journal of Experimental Social Psychology*, 10:371–384.
- Karau, S.J. and Williams, K.D. 1995. Social loafing: Research findings, implications, and future directions. *Current Directions in Psychological Science*, 4:134–140.
- Keirse, D. and Bates, M. 1984. *Please Understand Me*. Prometheus Nemesis Book Company, Del Mar, California.
- Latané, B. Williams, K., and Harkins, S. 1979. Many hands make light work: the causes and consequences of social loafing. *Journal of and Social Psychology*, 37:822–832.
- McKinney, D. and Denton, L.F. 2005. Affective assessment of team skills in agile cs1 labs: the good, the bad, and the ugly. *ACM SIGCSE Bulletin*, 37:465–469.
- Oakley, B.A., Felder, R.M. Brent, R. and Elhajj, I. 2004. Turning student groups into effective teams. *Journal of Student Centered Learning*, 2:9–34.
- Oakley, B.A., Hanna, D.M. Kuzmyn, Z. and Felder, R.M. 2007. Best practices involving teamwork in the classroom: Results from a survey of 6435 engineering student respondents. *IEEE Transactions on Education*, 50:266–272.
- Pfaff, E. and Huddleston, P. 2003. Does it matter if i hate teamwork? what impacts student attitudes toward teamwork. *Journal of Marketing Education*, 25:37–45.
- Price, K.H., Harrison, D.A. and Gavin, J.H. 2006. Withholding inputs in team contexts: Member composition, interaction processes. Evaluation structure, and social loafing. *Journal of Applied Psychology*, 91:1375–1384.
- Smarkusky, D., Dempsey, R., Ludka, J. and de Quillettes, F. 2005. Enhancing team knowledge: instruction vs. experience. In *SIGCSE '05: Proceedings of the 36th SIGCSE technical symposium on Computer science education*, pages 460–464, New York, NY, USA. ACM. ISBN 1-58113-997-7. doi: <http://0-doi.acm.org.innopac.up.ac.za:80/10.1145/1047344.1047493>.

- Smith, D.C., Becker, M., Burns-Howell, J. and Kyriakides, J. 2001. Creating high performance IS teams. In *Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT)*., pages 172–181, 25-28 Sep 2001.
- Steenkamp, A.L. 2002. A standards-based approach to team-based student projects in an information technology curriculum. In *Proceedings of the 17th Annual Conference of International Academy for Information Management*, pages 54–62.
- Trytten, D.A. 2005. A design for team peer code review. In *SIGCSE '05: Proceedings of the 36th SIGCSE technical symposium on Computer science education*, pages 455–459, New York, NY, USA, ACM. doi: <http://0-doi.acm.org.innopac.up.ac.za:80/10.1145/1047344.1047492>.