

# **A Case Study of Learner Insights on the Role of Team Input and Interaction among First-year Engineering Students in a Team-writing Project**

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The study examines learner insight on the role of team input and interaction in a critical thinking and writing team project. It presents a case study of 57 first-year Engineering students of varied ethnic backgrounds and nationalities ranging from 17 to 22 years of age from the National University of Singapore. It focuses on the learners' own views of how such a team project should be carried out by examining their assessment of the role and significance of individual as well as the team as a whole in the critical thinking and writing of the team project paper. The specific purpose of this study is to show firstly, that team-writing requires a special set of skills that individuals can only acquire by working in teams and by understanding the special dynamics of teamwork and secondly, that the effective interaction among team members can have a significant effect on the critical thinking and writing in a team-written project paper.

## **INTRODUCTION**

The concept of working in teams is common today, in both the corporate world and in academia. The ever-increasing number of team-driven projects in both these arenas has resulted in experienced interviewers often probing candidates for information about candidates' willingness and ability to work in teams. This is usually done through hypothetical or contextual questions in an effort to glean information that would help interviewers decide if the candidates are indeed team players. The reason employers ask such questions at employment interviews may not necessarily be because work-related projects involve extensive writing, but because employers prefer staff who can work with others on tasks that require a variety of input, discussion, consensus-based opinions as well as synthesis of ideas and data. The rationale here is that "more heads are better than one" if the task involved entails a

variety of input and extensive fact-finding. A further reason could be that the stakes involved are so high that it would be safer to base crucial decisions on the critical appraisal of the data by a group rather than by an individual.

In keeping with this trend, it is logical to incorporate teamwork into the university curriculum as an important aim of tertiary education is to prepare students adequately for the demands of the working world. Livingstone and Lynch (2000: 326) argue that team-based learning “can be a method of increasing complexity in the learning experience, which thus strengthens students’ preparedness for the complex environments into which they move after completing their degrees.”

### **Rationales for study**

This article is based on a study of first-year engineering students at the National University of Singapore, working in groups on a team-writing project in a course entitled, Critical Thinking and Writing (CTW). The course objectives are stated as follows:

...to foster the critical thinking, reading and writing skills which engineering students need to be successful in the university and in the engineering profession.

Centre for English Language Communication (2001: 31)

To achieve this aim, students are “taught the fundamentals of analysing written ideas/arguments of others and they simultaneously practise writing approaches typical of academic and professional settings: exposition, evaluation, analysis, argumentation and research” (Centre for English Language Communication, 2001: 31). The emphasis is thus, on training students in “higher order skills” similar to the skills described by Cockburn and Ross (1978) who explain that,

Students learn in small groups through co-operative academic work and it is perhaps precisely the interactive element of small group work that brings about what can be called the higher order types of learning. By this we mean, for example, the development of judgement or interpretative skills.

Cockburn & Ross (1978: 22)

This study is based firstly on the rationale that team projects at the tertiary level, when designed specifically to replicate real-life workplace contexts (in this case, an engineering context) could provide a valuable learning experience that would prepare undergraduates for similar workplace demands and in so doing enrich the individual, both intellectually and socially (Cockburn & Ross 1978).

The second rationale is that learners at the tertiary level would be able to comment on their own learning when provided with the opportunity and the right kind of guidance. This, in turn, could provide valuable insight for teachers at the tertiary level on alternative or supplementary methods of assessment.

## Literature review

The organisation of students into project work teams is based roughly on Kenneth Bruffee's (1983) concept of consensus groups which suggests that students be asked to form groups of three to four people working on a common task.

The concept of cooperative student projects which provide students with opportunities to "clarify their thinking through talking and writing, to test their ideas against other students, to appreciate new perspectives and to practise group communication skills" (Meyers & Jones, 1993: 75) is reflected in the kind of experience that students had in the group projects in this course. In her discussion of the second of two types of collaborative writing, Murray (1992: 101) refers to group writing tasks in which text is "constructed through oral discussion," akin to social processes in which writers share a common goal and abide by certain social and interactional rules to work on areas of shared understanding.

Further support for team work is provided by Chamot (1996) who states that

...developing a report based on extensive reading about a topic is a complex task that can more easily be achieved with strategies such as planning, selective reading, making inferences, *cooperation*, and evaluation.

Chamot (1996: 112)

Chamot and O'Malley (1994: 375) also mention cooperation or "working together with peers to complete a language task, pool information, practice, or get feedback," as one of the social and affective strategies that assists learning which, in turn, is in keeping with the first rationale for this study that team work fosters learning. Sandberg (1993) also argues that

Critical thinking skills such as listening analytically, attending to other points of view, negotiating, and evaluating one's own point of view are more likely to occur in small group problem-solving than if the student works alone.

Sandberg (1993: 142)

Team writing, however, is not without its problems. Elbow (2000: 373) states that although collaborative or team writing encourages students to become "more conscious and articulate about rhetorical decision-making," such writing is often more difficult, takes longer to do and results in disagreements. The implication is that students have difficulty reaching a consensus and this probably delays actual writing. Elbow further explains that because of the disagreements, collaborative writing is often poor quality writing, the whole process of which tends to silence the "weaker, minority or marginal voices." The letter-writing task, on which this study is based, was designed to see if students could actually anticipate some of the problems related to a team-writing project such as the one they were about to embark on by thinking analytically about it.

Trimbur (1989), however, views the element of disagreement among team members in team writing, quite differently. He argues that consensus-building actually

gives members in a group a stake in collective projects. If anything, it is through the social interaction of shared activity that individuals realise their own power to take control of their situation by collaborating with others.

Trimbur (1989: 602)

This means that students actually begin to understand how people differ from one another when they work in a team, and through this understanding, develop confidence and realise their own abilities to assert themselves. Trimbur (1989) emphasises that

it is this very “dissensus” or disagreement that arises among team members that actually enables students to understand the power play that exists in group discussions.

### **Aim of study**

This study aims to examine learner insight on the role of team input and interaction in a team-writing project. Specifically, it attempts to examine the intricacies of the relationship between the thinking of several individuals working together in a team to achieve a common goal, namely the project paper which they had to complete and hand in at the end of the twelve-week semester.

Before presenting the research set up and design it is necessary to provide information on the course on which this study is based, particularly on the syllabus and assigned tasks in order to understand the logistics of the team work and the nature of interaction among students.

### **The critical thinking and writing course**

#### ***The assigned task***

The teaching methods employed in this course include lectures, tutorials, student-tutor conferences, critical writing workshops, with special emphasis on the process of thinking-through-writing and web-based activities using the discussion forum of the university’s Integrated Virtual Learning Environment (IVLE), which is an intranet facility. The discussion forum enables students and tutors to communicate regularly outside the confines of the physical classroom. In this study, the IVLE is used as a vehicle for the students to write and share their views with their classmates and tutors on various debatable issues. Although there is an oral presentation of the team project, clearly, the emphasis in this module is on writing with more writing than oral tasks throughout the course of study.

The evaluation of this course is carried out in two parts; continual assessment comprising two individual writing assignments, a team written project assignment and an oral presentation of that team project accounts for 60% while a final

examination makes up the other 40%. The data for this study is based on a letter-writing exercise that students did in connection with their team-writing project.

It is important that the team writing project task is challenging enough so that it provides a learning opportunity that encourages critical thinking skills which, when employed, would hopefully enable students to either expand or build upon existing knowledge and/or acquire new knowledge and skills. In this study, the students had to imagine that they were a part of a special Industrial Safety Taskforce that had been set up by the Singapore Ministry of Manpower's Occupational Safety and Health Division (OSHD) to improve the safety of high-risk industries in Singapore. Their task was to select a high-risk industry, identify problems with safety issues affecting employees, the public or both, design a research plan to examine the current situation in that industry, and write a formal proposal recommending safety measures to reduce the elements of risk involved. Finally, they had to present this information in as structured and reasoned a manner as possible so that the argument was convincing to their reader(s).

The formal proposal was to be submitted to the Director of the OSHD for his/her approval. Students were also informed that in the given context, it was likely that the proposal could also be read by the Director's peers and/or select subordinates. Students were also reminded that since the proposal was to be written in accordance with the stipulated requirements of a critical thinking and writing course, the writing had to demonstrate critical analysis and discussion of findings so as to ensure adequate substantiation for the conclusions and recommendations that follow. This meant that it was insufficient to merely identify the problem or state possible solutions. The problem and its implications had to be discussed thoroughly in the context of the current situation and the possible solutions, analysed and evaluated for their advantages and disadvantages in the short as well as the long term. Finally, the recommendations had to be made with emphasis on the practicality of implementation, affordability and possible counter arguments. In this way, the team-writing task in this study falls within Kurfiss' (1988) definition of critical thinking, which states that critical thinking involves

...an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified.

Kurfiss (1988: 2)

In keeping with the aim of providing a valuable learning opportunity for students, it was found that the set task did pose some challenges to them. This was observed in the previous semester where many of the students had little or no knowledge, at the start of this project, as to what a high-risk industry was apart from what had been explained to them through basic definitions in the assignment brief. Progressing from this point to the next stage of writing meant that students had to brainstorm hypothetical situations in their teams and then identify the problems, source for possible solutions to the problems, gather supporting evidence, etc. In the next stage of actually writing the draft of the proposal, it was crucial for teams to be able to justify their assumptions with hard evidence and to build their arguments for their solutions convincingly, using language that could win the approval of the target audience.

The significance of having all members of the team involved in every stage of the project was emphasised to the students so that they could bear in mind, while working on the project, the need for consensus among team members. Further, students were also reminded that the text (a six to eight page proposal) had to come across to the reader, both in form and expression of ideas, as if it were the product of one mind. In this way, the task was designed in such a way that all team members were required to be involved in the decision-making from the stage of preliminary discussions when they had to agree on the topic and research strategy, to the stage of gathering of data, analysis of that data, synthesis and organisation of information and finally, that of writing and revising the actual text.

### *The tutor's role*

The tutor's role as facilitator was one that involved emphasising preset deadlines stipulated in the course outline for the completion of the project and providing guidance to the team rather than closely monitoring their progress. More specifically, this guidance

included clarifying students' doubts when students encountered any problems but in a minimally intrusive way. This meant that the tutor was not present at group meetings but maintained an open channel of communication with the students both in the classroom as well as outside of it through e-mail. In this way, students were empowered to exercise their sense of responsibility and control their own as well as their team members' pace of work and progress.

The rationale for this was two-fold. Firstly, such independence would enable students to make conscious decisions about how much effort they wanted to put into the completion of the task and secondly, building rapport among team members so as to maximise team interaction during group meetings. As first year students, in their first semester, the majority of the students were meeting and coming together as classmates for the first time. As a result, it is possible that students had to ensure that their time spent at project meetings was optimised and channelled towards completing the team project on time which, in turn, probably involved decision-making about team members' roles and responsibilities, deadlines, research strategy and methodology, etc. In a sense, students would have had to work consciously at knowing how each of their team members worked, and at motivating one another to complete the job successfully.

Support for minimal interference from the tutor giving rise to maximum interaction among team members is found in Bruffee's (1973) article, where he states that

...for college students – learning to write is in great measure a process of gaining new awareness. Gaining new awareness of any kind is likely to be a painful process. People need some kind of support while undergoing it. And the evidence provided by collaborative activity in the society at large suggests that people can gain both awareness and support as adequately in a small group of their peers, as from the ministrations of a teacher.

Bruffee (1973: 54)



## METHODOLOGY

In this case study 57 first-year Engineering students ranging from 17 to 22 years of age, 49 of whom were Singaporeans were involved. Out of the eight foreign students who were placed in different classes, three were Indian nationals (two of whom had been resident in Mauritius and Jakarta for many years), one Pakistani; three were Chinese from Mainland China and one Malaysian (who had studied in Singapore for many years).

The students were given a hypothetical situation in which they were to imagine that a close friend or relative would be taking the CTW module in the next semester. Students were asked to write an e-mail letter to the friend or relative, giving their advice on the requirements of the team project or assignment 3, and how they should contribute individually to the completion of the project. Further, they had to comment on how the friend or relative's team members should conduct themselves when working on a similar team-writing project. The e-mail letter task was chosen to indirectly provide students with the opportunity to think about and comment on how they wanted to carry out their own team project by distancing themselves from the task at hand. It was also believed that through such an activity students could gauge their own level of motivation to their projects. Chamot (1996) explains this importance of providing students with an opportunity to think about and comment on their own learning:

Metacognitive and social/affective strategies are closely tied to student motivation. By using metacognitive strategies, students come to understand that they have power over their own learning and can choose to be successful by effort and appropriate strategy use.

Chamot (1996: 112)

The exercise that was used for data collection in this study was given to the students in Week Three of the course (a week after the students had been given the brief for the team-writing project) as the third individual, critical writing, practice exercise they had to submit electronically to the tutor. Two other writing tasks that required critical writing had been given to students through the discussion forum, a virtual learning environment mentioned earlier. These required students to write, firstly, on whether or not

engineers should ever put cost above safety considerations, and secondly, to what extent plagiarism could be compared to video piracy. Both tasks were followed up with class discussions on the same topics during tutorials.

In the practice exercises that were carried out over the discussion forum, the tutor and classmates could respond to anyone's views by requesting further clarification on the reasons given or providing counter-arguments, etc. This interaction provided students with practice in looking at issues from various perspectives and responding to opinions in writing. Furthermore, in tutorials as well as in lectures, before each practice exercise, students were briefed on how to give reasoned opinions so that they could be accustomed to not just stating their views but also explaining and substantiating them with concrete examples, parallel situations, analogies and illustrations.

The particular exercise used for data collection in this study required students to identify and explain the specific needs of a team written project such as the one that they had been assigned and, to give advice to the friend or relative that would enable him/her to cope with the demands of completing it. Students had to consider the role of the individual as well as that of the team in such an assignment and give their substantiated views on what they felt was necessary to produce a good team project. In doing so, it was expected that students would not only be engaging in a critical writing exercise but also, indirectly, commenting on their own levels of commitment and motivation in the team project in which they would be involved in. Further, it was hoped that the students' insights would reveal some of the strategies that they would use in completing their own team writing projects.

For the purpose of writing the e-mail the students were guided by the following questions. These were:

- A. What advice would you give to a friend or a relative who will be taking this CTW module next semester?
- B. Consider the individual's role in the team and the team's responsibility in the completion of the written proposal. How should each contribute to the researching and writing of this project?

- C. How do you think the individual's and team's contributions will affect the quality of the written report?

Individual e-mail letters were printed out and analysed for students' perceptions on the role of team input and interaction in a team-writing project. Their individual views as well as the reasons given to substantiate these views were then evaluated.

### **Limitations of the study**

One of the limitations of this study is that the sample group was small comprising just 57 first-year engineering students at the National University of Singapore. Hence, the study findings can only be generalised.

A second limitation is that the study relies entirely on learners' views on team interaction (in the e-mail to the tutor). Even though students were guided by specific questions when writing their letters, the reliability of learners' insights in this situation may have been limited by whether or not they had had prior experience in critically analysing the needs of a team-driven writing project. To comment objectively on what is expected of the individual as well as the team to ensure progress on such an assignment, requires students to be able to see the 'big picture', which in this case, is the successful completion of the team project. This meant that students had to visualise issues like individual strengths and weaknesses within the team, review how to optimise the former so that the team's objective could be achieved, and decide how to manage the latter such that delays and tensions that could pose obstacles to the completion of the project could be minimised. In this way students were, in fact, required to comment on the "metacognitive and social/affective skills" mentioned earlier by Chamot (1996: 112). It was assumed, in this study, that the process of interacting effectively with their team members would enable students to do this.

Finally, since the majority of the students were Singaporean (49) and only eight were foreigners, ethnic variety and its implications were only selectively explored as a research variable and discussed in the section on findings and discussions.

## FINDINGS AND DISCUSSION

This study was based on the rationale that teamwork could offer a valuable learning experience that would prepare undergraduates better for the workplace and also on the assumption that students, when provided with the opportunity to comment on something that is relevant to their own experience, would be able to give valuable insight. Further, it was believed that such a task would require students to reflect on how they themselves would carry out a team project of this nature, and in so doing, set their own goals and be committed to the demands and responsibilities of their own team project.

The students' letters to their friends or relatives who were supposed to be taking the same module in the next semester, brought to light certain common issues. It was interesting to note that the majority of the Singaporean students mentioned issues such as the significance of good communication, cooperation, coordination and clear team objectives; the need for consensus and the existence of "dissensus" (Trimbur, 1989), and the need for clear allocation of duties and a team leader or coordinator. However, the foreign students, particularly the Chinese and Pakistan nationals focused on other issues such as clear definition of the individual's role in the team. In fact, the Pakistani student used the analogy of individual bricks that make a strong brick wall to stress the importance of individual's role in teamwork. He said,

A wall is always strong and solid if all the bricks are placed at their respective places and even if one brick from anywhere in between is missing the wall can crash. So every brick has to make a contribution ... .

He added that the division of labour should be based on individual strengths so that each person could contribute his best to the team project. Two students of Chinese nationality, although fairly unfamiliar with teamwork, gave just as insightful comments on the matter. One student said,

Although I am not very familiar with this, I find it is very important. We can learn a lot of things when doing a team project, such as how to communicate with people, how to cooperate with others, and how to do research and so on. ...

He added further that,

A team is not simply a combination of all individuals. If everyone can find a suitable position in the team and cooperate well with others, this team can do the project well, easily and efficiently. To unite as one is the most important for the team, or they cannot work well together.

A second Chinese student who started by saying that “working in a team is one of the current popular management techniques,” went on to add that,

...the individual(s) in the team often focus on their parochial interests, fail to open themselves to broader points of view, and become critical of the motives and work style of their team mates.

Interestingly, the student then suggested ways in which such problems could be minimised by saying that students should

interact, discuss and pose questions to all members of the team.

Exchange, defend and rethink ideas.

It is clear that although the students of Chinese nationality were not used to working in teams to write a team project, they were aware of the importance of team work in the corporate world and of how it could be successfully managed.

Another interesting point to note is that three out of the eight foreign students mentioned the importance of having a team leader or coordinator who would be responsible for driving the team to meet its goal. However, none of them mentioned consensus as a means to reaching decisions. The reason for this could be that decision-making was seen by these students as being the responsibility of the team leader. On the other hand, nearly 36% of the 49 Singaporean students felt very strongly that a consensus of ideas was crucial for the team to complete the project successfully.

What is even more interesting is that about 29% of the Singaporean students acknowledged that there could be conflict and

disagreements or what Trimbur (1989) refers to as “dissensus” among group members, at least initially, during project meetings and discussions. This shows these students were able to foresee the possible problems of working in a team. Many students, however, were also able to suggest ways in which such differences could be sorted out. In fact, one Singaporean student provided a positive view to these very differences in his letter of advice to his relative by saying,

Be receptive and objective about everyone’s ideas. In that way, the diversity within the group will prove to be an asset rather than a liability.

This comment is very much in line with the rationale that Trim provides for group or teamwork in the preface to Oskarsson’s *Approaches to Self-Assessment in Foreign Language Learning*,

Work in groups is useful for developing an awareness of criteria and self-identification with group objectives. Impressionistic judgements by group members on each other’s communication, even if they are unreliable, can be useful, since in the dialectics of discussion awareness of criteria is further sharpened. Moreover, the inhibitory effect of feedback of errors can be mitigated by positive group dynamics.

(Oskarsson, 1978: ix)

Clearly, the argument here is that even though group or teamwork is not without its negative elements, the positive learning that takes place through group dynamics and learning from and about one another through the process of thinking and refining ideas together far outweighs them.

Approximately 16% of the Singaporean students felt that there should be a team leader or coordinator who, in their own words, “is acting (acts) as someone guiding the team towards meeting the target and acting as a contact person between the tutor and the team members.” One student cautioned, however, that

There is a fine line between being a team leader and being too bossy, so care has to be taken here.

There was no mention of such problems by the foreign students when they suggested having team leaders. This could be due to cultural perceptions of roles within a group and that a team leader could be taking his/her responsibility more seriously in this case.

In this study, both Singaporean and foreign students made shrewd observations as to what Assignment 3 really entailed and expressed these observations through their advice to their relatives. Through these observations, the students demonstrated their insight into the complexities of what the actual writing would involve. One student said,

...there may be a tendency for the team to just cut and paste all the information they have in hand into the assignment without making (sic) critical analysis of the information. This will result in the assignment (sic) seriously lacking in quality and depth.

On the same issue, another student explained,

The whole team should consolidate and unify all their individual results/ findings in the same tone and style of writing that is recognisable only as one voice to the targeted audience. Otherwise, the report may become too “scattered” in its presentation of ideas and may lack coherence on the whole. This will cause the proposal report to be unconvincing and as a result lose credibility.

This is an indication of the students becoming aware of the importance of the team writing assignment and the need for producing a cohesive and coherent piece of writing.

Yet another student commented on what she felt was the real goal of the team project,

The goal of doing this project is not just to score well but in the process, each member gains new insight and knowledge both mentally and morally.

She seemed to be suggesting that the learning that took place through team interaction could be an enriching experience for team members’ knowledge and personality.

Approximately 42% of the students, both Singaporean and foreign, agreed that constant communication and interaction among team members was the best way to complete the project assignment and about 30% stated that cooperation among team members was an essential means to progress. One Singaporean student wrote that,

Active participation and contribution from all members would result in a more informed solution that covers more areas of consideration....This would also give more credibility to the project.

Such comments by students seemed to indicate their awareness that team input and interaction could set the stage for the exploration of the various ramifications of a problem situation more completely. Furthermore, their insight seemed to support the idea that teamwork, when carried out efficiently and effectively, could give rise to well-reasoned and hence more convincing ways of solving the problem or alleviating it.

Finally, a succinct comment from a student on the effectiveness and success of team input and interaction shows that students reading this course have learned to develop learner insight:

The individual provides his own unique views and styles. ...The team will synthesise the product... this end-product will usually end up more significant than all the ideas purely added together, especially if the team goes on deeper into analysing and improving each of the plausible ideas, and subsequently linking them up.

## **CONCLUSION**

In conclusion, it is clear that a writing activity that presents students with an opportunity to give their reasoned views on an issue could elicit valuable responses from them. It appears that the greater the number of such opportunities that we teachers provide to students, the more ready they will be to think critically when such situations present themselves in the real world. Evidence seems to point to fact that critical thinking and writing are both specific skills that are acquired through situations that require problem identification, analysis, troubleshooting and rationalising.



This study also suggests that, in this particular context, learners, both Singaporeans and foreigners, were able to give their insights on how team input and interaction affect a team writing task and how important it is to sort out personal biases in order to achieve common goals. Students were able, when posed with the challenge, to give their views on how such an assignment should be carried out to produce the best results. Although there were some differences observed between the perceptions of Singaporeans and foreign students, all the students were able to comment on both the individual's as well as the team's role on how a good team-writing project could be done. In this way, this exercise in itself was one that involved critical thinking and writing for the individual because students were given a hypothetical situation in which they were asked to visualise themselves in advisory roles. To do this, they had to make comparisons with their own situations, draw parallels and express their views while justifying those views.

Finally, this study suggests that learners' insights, when gathered in a planned exercise such as the one in this study, could provide a valuable alternative source for assessment of learners' metacognition in relation to particular skills.

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