Impact of Collaboration on Aspects of Technical Writing Skills

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Abstract

This paper aims to investigate the impact of a Technical Writing course on the development of technical writing skills in a collaborative environment. The study, involving forty engineering students, was based on a comparison of samples of students' writing produced at the beginning and at the end of the course. It was found that students made the most significant progress in 'Cohesiveness', followed by 'Achievement of Purpose'. Although some improvement was seen in terms of academic vocabulary, not much development was observed in terms of accuracy and language use. What initially appeared to be 'errors' or 'deviations' in student writing were, at times, conscious choices made by the students. The experiment also showed the value of comments handwritten by teachers on students' scripts.

Keywords

Writing, Collaborative Leaning, Error Analysis, Technical Writing

I. Introduction

Collaborative processes involving short-term (e.g. Group discussion or Brainstorming) as well as long-term (e.g Project Work) group work forms the nucleus of a number of educational activities in classrooms. It has been seen that collaboration processes tend to become increasingly complex in technical writing projects aimed at knowledge generation. Most of the writing curricula use group work and collaboration in one form or the other. Educators' experiences, however, also show that not all of this collaboration is successful. Educators have highlighted problems such as free riding or social loafing [1, 2]. It has also been found that individual members' satisfaction (or absence thereof) may influence team performance. [3, 4, 5]

On the basis of a study [6] that analysed interactions on a Facebook page created for a set course in the university curriculum, it can be interpreted that students attribute high value to task planning and sharing their work equally. They are usually 'happy' to work collaboratively and emphasise individuality and responsibility rather than reliance on the group members. In general, it seems that some students were also more individually inclined than others. This study indicates that students are generally collaborative in their attitude and can learn better with a collaborative instructional environment where necessary guidance and structure is provided.

Collaborative practices in classrooms are so widespread that their extension can be easily and naturally seen in e-learning situations. A study carried out in Singapore [7] shows that asynchronous web-based interactions (and collaboration) can add a special dimension to learning. The study presents an analysis of two projects involving Engineering students in which institutionalized discussion boards were created for online group interaction. Data for both projects were collected from student surveys and postings on the discussion boards. While students in the first project viewed themselves as accountable for their own learning, students in the second project had a somewhat negative perception of the online discussion platform. Analysis of student postings from both studies also provided an insight into how individuals identified themselves as an online group and how such groups are maintained.

Analyses of these and similar studies show that collaboration is an important dimension of the success of teaching and learning in classrooms. [8], [9] Studies also show that group work, teamwork, and collaboration are deeply rooted in most educational practices and a considerable number of teachers as well as students see them as essential parts of educational activities.

II. Method of Study

Forty Engineering students at Universiti Teknologi Brunei were involved in this study. Subjects were university students studying core courses that included a group writing project in which the students had to work collaboratively and cooperatively. The student groups aimed to produce a longish piece of audience-oriented writing. Although students were free to choose their audience, they were expected to have a clear and specific idea about their audience through within-group deliberations. They were encouraged to formulate a communication strategy that is appropriate to that audience and subsequently implement that strategy in the production of a discursive piece of writing aimed at knowledge generation. They were intentionally restricted in terms of the choice of an academic research topic and were asked to produce an academic report. Examples of some topics chosen by the students are given below:

- Selection of Ingredients and Procedure for the Manufacturing of a Perfume
- Safety in Chemical Industries
- Importance of Waste Management in the Textile Industry
- Offshore Oil Spill on Pipeline and Tanks: Causes and Effects

The course used minimum teacher-led interaction and maximum group interaction. Students were encouraged to brainstorm and discuss as well as to read and comment on drafts written by their peers. Guidelines for effective group interaction were provided to achieve collaboration that would be pedagogically effective.

The study was based on comparison of samples of students' writing at the beginning and at the end of the course. The writing was analysed using the following criteria:

1. **Accuracy**: Accuracy refers to the mechanics of the language. The following three are major aspects of accuracy.
- Language free from grammar mistakes.
- Words spelled correctly.
- Register appropriate to the situation and/or context.
2. **Cohesiveness and Cohesion:** The following three aspects were considered under this criterion.
- Use of cohesive devices
- Organisation of paragraphs
- Thematic unity
3. **Academic vocabulary:** This criterion covers two aspects.
- Use of terminology
- Use of academic expressions
4. **Achievement of Purpose:** This criterion relates to the

fulfilment of the objective of the writing exercise for a specified audience. It relates to two aspects.

•   Effectiveness of the communication strategy
•   Effectiveness of the communication of the main theme

III. Findings: Collaboration Impact

Figure 1 and 2 represent the average scores (in percentages) attained by students before the beginning and at the end of the course. Figure 2 indicates that a significant improvement was achieved in terms of 'Cohesiveness' in writing.

	Before the course	At the end of the course	Improvement
Accuracy	56	58	2
Cohesiveness	56	78	22
Vocabulary	54	62	8
Purpose	52	68	16

Fig. 1: Average scores attained by students (Figures in percentages)

As can be seen from Figures 1 and 2, students made the most progress in Cohesiveness, followed by Achievement of Purpose. Although some improvement was seen in terms of Academic Vocabulary, not much improvement was seen in terms of Accuracy and Language Use. The success of collaboration in the areas of Cohesiveness and Achievement of Purpose may be attributed to the fact that collaborative classrooms tend to encourage peer reading and peer review of initial drafts more often than the conventional classrooms. In this project, students were expected to review drafts and comment on the effectiveness of language use and organisation. Any challenges related to inadequate use of language or organisational pattern were addressed and resolved in the group meetings. It seems that conventional teacher-led methodologies may be less effective in terms of improvements related to Cohesiveness and Achievement of Purpose.
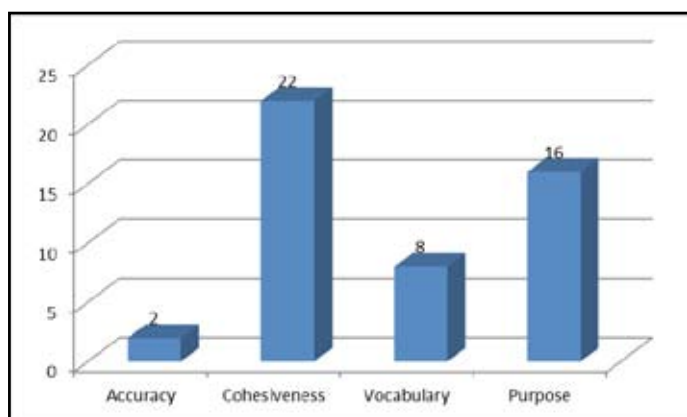

Fig. 2: Impact of Collaboration on Aspects of Technical Writing Skills (Figures in Percentages)

What initially appeared to be 'errors' or 'deviations' in student writing were, at times, conscious choices made by the students. This was especially true across two aspects of Technical Writing Skills: Accuracy and Cohesiveness. It would be interesting to study the explanations provided by the students when their writing deviated from the prescription. Table 1 below provides six most common errors or deviations (embedded with asterisk) along with the explanations provided by the students.

Error/Deviation	Student Explanation of Choice
Use of future tense in the Abstract (*This report *will discuss*..***)**	Students find it odd that the Abstract is supposed to be written in Past Tense. Since Abstract appears at the beginning of the report they see it as a kind of introduction to the report and the future tense seems appropriate for them to be used in the Abstract.
Use of Present Tense in the Abstract. (*The safety factors *are also taken* into account...***)**	Students tend to think that the Present Tense is more appropriate since the project and their involvement in it are still current.
Consistent use of Past Perfect (*It *had been observed* that..***)**	Some students tend to support the use of Past Perfect tense. They tend to think that fist the project was completed (Older past), then the conclusions were drawn (past) and then the report was written (past).
Lack of Subject-Verb agreement (*Cost considerations *plays* an important part.)*** ***(Oil and Gas *has been a major contributor. *)***	Students seem to see only the first word in the noun phrase as the Subject.
Use of informal register (**To begin with, let's discuss... ****)**	Students justified the choice of informal register on the grounds that the report is being written for non-technical audiences.
Lack of cohesive devices	Students find the use of cohesive devices repetitive and artificially induced.

Fig. 3: Errors and Deviations in Student Writing

The analysis above shows that the errors and deviations can be seen as evidence of learning rather than of failure. Such 'meaningful' failure is more likely to lead to productive learning if the learning can be facilitated with a discussion about student choices. The analysis also shows that mere re-teaching or remedial teaching may not be helpful in such cases. What might be needed is an instructional plan that is well-grounded in the explanations provided by the students.

IV. Findings: Teachers' comments

The experiment also showed the value of comments handwritten by teachers on students' scripts. Comments written in the margins on aspects of language use and overall comments on organisational aspects seem to create a valuable learning space for active learning. It was also observed that some types of teacher comments are likely to have more impact than others. For instance, explaining the necessity and grounds for revision seem to work best in most contexts. On the other hand, comments that merely refer to a grammar rule seem to be less effective.

Researchers have earlier investigated [10] the impact of teacher and peer comments. Comments written by teachers may be categorised as follows:

Category 1: Comments providing model(s) for revision
Category 2: Comments pointing out the necessity for revision at a particular point in the script
Category 3: Comments recommending students to refer to a specific point or portion in the study material.

Category 1: Comments providing model(s) for revision

Comments in this category may actually provide students a word, phrase, or even a whole sentence that should have been used or included. It was clear from student interviews that they seem to prefer this type comments the most. However, it was also evident that such comments may only help them for that particular revision. As researchers have pointed out [17], a disadvantage of these comments is that the assessors might seem to be imposing their own views on students' writing. More problematically, the students might accept this as an integral part of the writing process and may not be able to revise their writing in the absence of a prescribed revision model.

Category 2: Comments pointing out the necessity for revision at a particular point in the script

Using this type of comments, the teacher draws the students' attention to a particular portion of their writing, and suggests that a revision may be necessary. The comments also point out why a revision is necessary and appropriate. Here are some examples of this type of comments:

• Use correct method of including figures.
• The subject line is too general. Use a more concrete subject line.
• Tables are too wordy.
• Reduce verbal elements. Include more visuals.
• Improve sequence of elements and organisation. The ending is rather abrupt.

During the student interviews it was seen that students generally seem to have a neutral attitude towards such comments. They sometimes found this useful, but would rather prefer the comments in Category 1 as discussed above.

Category 3: Comments recommending students to refer to a specific point or portion in the study material

Earlier research on deviant writing patterns in student writing suggests that students seem to have obvious difficulties in merely following the recommendations given in the study material. [10] This is especially true of the concepts and notions in the study material that are in direct contradiction with students' cultural learning. It is therefore necessary to provide instruction that is more deeply rooted in the students' value system. This would involve a deeper exploration of the rationale behind the academic style of and organisational patterns in technical writing.

V. Conclusion

Any learning space has a vast potential for collaborative work. However, a number of factors related to the student psychology, needs, mindset and context play an important part in the successful use of this space. [11-13] As educators, we need to analyse the context and setting before deciding to engage students in collaborative group work and fix the parameters for the collaborative work. At the same time, to encourage collaborative group work, we may have to change the way we relate to our students. [14-17] For instance, we may find ourselves adopting a student-centric approach as we negotiate and persuade students to accept the use of the collaborative mode, and later, motivate them to use it. We need to give clear written instructions so that no student feels lost or helpless in the collaborative space. We also need to identify potential problems of collaboration and advise students to take charge of their discussions, accepting freedom of expression and monitoring (but not directing) the way students use language, and work as a group. [18] In short, instructors may need to function in the collaborative environment as a facilitators rather than directors, advisors rather than managers of interaction.

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