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<th><strong>Title</strong></th>
<th>Nurturing reflective and independent learners through a technical communication course</th>
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<tr>
<td><strong>Author(s)</strong></td>
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<tr>
<td><strong>Citation</strong></td>
<td>The 2013 IEEE International Conference on Professional Communication (IPCC 2013), Vancouver, BC., Canada, 15-17 July 2013. In Conference Proceedings, 2013</td>
</tr>
<tr>
<td><strong>Issued Date</strong></td>
<td>2013</td>
</tr>
<tr>
<td><strong>URL</strong></td>
<td><a href="http://hdl.handle.net/10722/187379">http://hdl.handle.net/10722/187379</a></td>
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Abstract - This paper reports the findings of an exploratory study of engineering students’ perceptions of reflection and independent learning before and after taking a mandatory technical communication course titled Professional and Technical Oral Communication for Engineers in their first semester of study at a university in Hong Kong. Three kinds of research instruments were used to generate data for analyses: pre- and post-questionnaire surveys, semi-structured interviews, and students’ reflection and self-access records. The study’s findings show encouraging results in three ways: (1) the course participants were generally receptive to the ideas of reflection and independent learning in the context of technical communication; (2) those who had had prior experience in reflection and independent learning continued to appreciate the value they brought to learning; and (3) the course participants’ pre-conception that reflection and independent learning were only ‘one-man shows’ was changed and they began to value the involvement of their ‘significant social others’ in these learning pursuits.

Index Terms – Independent learning, reflection, technical communication

INTRODUCTION

With the advancement of technologies and ease of global communication, the workplace of the 21st century is no longer the same. The emergence of a “new work order” [1] recognizes the blurring of professional boundaries, destabilizing of hierarchical structures and the need for the individuals to take up multiple roles in the organizational settings [2]. The Engineering profession, for instance, encompasses a broad range of expertise and is interwoven with many industries, such as business, management and construction. Being technically competent in one’s own field may no longer suffice in this complex professional world; reflective practice and continuous professional development has been emphasized as key indicators of performance, on the basis of which career success and security are often determined.

This study stems from the belief that reflection and independent learning are essential skills for university learning and in professional contexts [3] [4]. As a result, an out-of-class learning component was integrated into a technical communication course titled Professional and Technical Oral Communication for Engineers (ProTech hereafter) to facilitate the learners to improve their own technical presentation skills through reflecting on their performance and identifying relevant learning resources.

ProTech

ProTech is a 12-week course taken by all first-year engineering students at the University of Hong Kong (HKU). The Faculty of Engineering of HKU has five departments (Civil Engineering, Computer Science, Electrical and Electronic Engineering, Industrial and Manufacturing Systems Engineering, and Mechanical Engineering) and has since September 2008 adopted a common admission practice. Students admitted to the Faculty do not need to declare their majors or concentrations until the end of the first semester of their studies when they have taken a few introductory courses in mathematics and engineering, as well as ProTech. This admission arrangement posed great challenges to the design of ProTech mainly because of the large number of course participants (more than 400) whose English proficiencies could vary a lot. This challenge made it difficult for us to cater for the needs of individual students. The integration of the Self-Access and Reflection (SAR) record was to address this challenge by providing a platform for the students to take charge of their own learning [5].

The syllabus and structure of ProTech also necessitated the integration of the SAR record. ProTech covers the technical presentation skills needed in students’ academic studies and the workplace [6]. Students are required to deliver three presentations on topics related to engineering: a diagnostic pair presentation, a group presentation, and an individual presentation. Recycling, and improvement or refinement of skills learned are therefore assumed. Students are required to complete the SAR record between
presentations by (1) watching their own presentation videos for critique, and (2) reflecting on their experience of using resources to improve the weaknesses identified by the teacher and themselves. The teacher will then indicate to what extent the students make improvements on those weaknesses as evidenced in their subsequent presentations.

**THE CURRENT STUDY**

The study reported here gauges if there were any changes in students’ perceptions of reflection and independent learning after taking ProTech.

Three research instruments were adopted, namely the questionnaire surveys, semi-structured interviews and students’ SAR record entries.

**I. Questionnaire surveys**

Two questionnaires were administered to all 446 ProTech students of the 2011-12 academic year, with one before the course began and one after it ended. In addition to soliciting factual information, such as whether they had any prior experiences in reflection and independent learning, perceptual data was also collected through word-association questions. Respondents were asked to come up with three words or phrases that they associated with ‘reflection’ and ‘independent learning’.

In total, 221 and 157 students responded to the pre-course and post-course questionnaire surveys, respectively, representing response rates of 49.55% and 35.20%. Among the respondents of both surveys, 95 of them were found to have responded to both surveys, which allowed comparisons of their answers before and after taking ProTech.

**II. Semi-structured interviews**

Of those participating in both surveys, nine respondents agreed to be interviewed. Five of the interviewees had their former education in mainland China while the rest in Hong Kong. The semi-structured interviews probed further into their responses to the questionnaire surveys, particularly their learning experiences prior to and during ProTech.

**III. Students’ self-access and reflection records**

The SAR records completed by the ProTech students were retrieved and converted to text files. The total number of words used for analysis was 853,215. This SAR corpus was then compared against the British Academic Written English (BAWE) corpus [7] using WordSmith 6.0 [8]. The Keywords function was used to generate a list of words whose frequencies were statistically higher in the SAR corpus [9]. These keywords were then analyzed with reference to the context of their uses in the students’ SAR record entries with the assistance of the Concordancing function. The focus of the analysis was on the verbs chosen as they implied the actions students took to improve their areas of weakness. For instance, the verb *make* appeared 5,712 times, including all the derivatives such as the past tense form *made*, in the SAR corpus. Some examples are as follows:

- I watched the clip “use your visual aids.” There are instructions in the video on how to *make* the visual aids, how to use them during presentation and it gives some tips on effective use of visual aids. (SAR009)
- Also, in my presentation, audience sometimes might not capture the key information in the long content. Hence, my presentation skills became important. I think I have to *make* good use of prominent. (SAR545)
- Stressing could let the presenter *make* good control of the presentation by indicating the transitions and the key words. (SAR561)

The three examples cited illustrate two interesting points. First, the verb *make* shows two potential meanings, with one of concrete referring to the production of physical artifacts as in Example SAR009, and another as an auxiliary with the core meaning lying in the subsequent verb *use* and nominalized verb *control* in Examples SAR545 and SAR561, respectively. Second, the ways the actions of *make* are realized are different. Examples SAR009 and SAR561 realize the actions as advice or guidelines, while Example SAR545 as commitment upon reflection as shown by the modal *have* to and mental verb *think*. Another example will be discussed later in this paper.

**FINDINGS AND DISCUSSIONS**

The main findings of the study drawn from the data collected from the three research instruments are presented as follows.

**I. Questionnaire surveys**

In the pre-course questionnaire, ProTech participants were asked if they considered themselves an active or passive learner. In the post-course questionnaire survey, they were asked if they considered to have become a more active, more passive learner, or the same as before. Among the 221 pre-course survey respondents, 121 (54.75%) considered themselves active learners while 100 (45.25%) considered themselves passive learners. As for the 157 post-course survey respondents, pleasing results were obtained. Over 76% of those responded considered that they had become more active while only around 1% felt more passive after taking ProTech.

The positive change in perceptions can be traced from the 95 respondents who completed both surveys. Forty-six of them who perceived themselves active at the beginning
of the semester considered that they were more active after taking ProTech. Also, 27 of them had their perceptions changed from passive to more active. Only 7 active learners and 14 passive learners perceived no changes.

Regarding reflective writing, 64% of respondents either had not ever done it or were unsure if they had had experience in it prior to taking ProTech. However, overwhelmingly positive results were obtained from the question in the post-course survey on the perceived usefulness of reflection to language enhancement, with over 87% considering quite or very useful.

As for independent learning, 107 (48.42%) respondents had participated in some form of independent learning during their secondary education. Similar to reflective writing, positive results were found in regard to participants’ perceived usefulness of independent learning to language enhancement. Over 86% of respondents considered it either very useful or quite useful.

The word-association questions provided an alternative means to elucidate ProTech participants’ changes in their perceptions or understanding of the concepts of reflection and independent learning. Four categories of terms can be identified, which are action, physical, mental, and personal.

Words associated with reflection: The action type of terms, which refers to activities or processes of accomplishing them, was found to be dominant in both the pre-course and post-course responses. The action term that had the highest frequency in both surveys was improve. Other popular action terms mentioned were think, comment, react, and respond. Relatively more marked differences can be observed from the choices of physical terms between the two surveys. Scientific objects or phenomena exemplified by terms such as mirror, refraction, and light were frequently mentioned in the pre-course survey, while artifacts related to ProTech such as resources, videos, and TED were often cited in the post-course responses. Mental terms that cover those cognitive activities and appraisal of entities were found to have taken up around 20% of the words in both surveys. Examples are spontaneous, fast, annoying, and joyful. Personal terms such as own, myself, others and audience took up less than 4% in each of the surveys. It is also worth noting that there were hyphenated compound terms prefixed with self as in self-evaluation and self-assessment taking up nearly 9% in the post-course survey.

Words associated with independent learning: Mental terms had the highest frequency in both the pre- and post-course surveys, occupying more than 30%. There was a strong association with the evaluative lexis active as evidenced by the fact that its frequency topped both surveys (4.7% and 3.1%). It is also gratifying to find that the negative term difficult, which was frequently mentioned in the pre-course responses, appeared only once in the post-course responses. The evaluative term important nevertheless became one of the top 10 most frequently mentioned in the post-course survey. Another noteworthy finding was that action terms had an increase of 9% in the post-course survey. Notably, the term reflect (2.7%) had the second highest frequency while none of the respondents mentioned this term in the pre-course survey. Reading (4.7% and 2.7%) was also considered to be a popular independent learning activity. As for physical terms, sources of information, including library, internet and resources were frequently mentioned in both surveys. Similar to terms associated with reflection, personal terms took up only a small proportion (4.5% and 2.0%) and yet the number of terms prefixed by self was quite noticeable (9.1% and 11.2%). Self-consciousness, self-control, self-discipline, and self-driven were the examples.

II. Semi-structured interviews

The previous section shows a general picture of ProTech students’ perceptions of reflection and independent learning. In this section, I will highlight three common themes found from the interviews with nine ProTech participants.

From individual to social learning: While the responses to the two word-association questions emphasized individualistic acts, the interviewees showed the awareness of learning from their ‘significant others’ (i.e., their peers during ProTech):

- “I mean at the beginning of the semester for reflection, I don’t need to see how others work; during the semester, I think it really helps to see how others do the presentations.” (INT002)
- “…to identify the differences between the classmates and some good presenters...after you find out the differences, you can find out things that you can improve, you can work on it. ” (INT003)
- “Not only you can learn your own things, you can compare yourself with other’s behavior.” (INT005)

Reflection and independent learning are transferrable skills: Not only were the informants appreciative of the instrumental value of reflection and independent learning to ProTech, they were aware of them as a kind of learning skill, both short-term and long-term:

- “I think to do independent learning, I think the most important is not to learn a lot from those materials. The most important thing is to learn the way to learning.” (INT002)
- “In the long run, it (independent learning) is very useful to me because I cannot always be supervised by the teacher.” (INT004)
Reflection and independent learning in response to the diversity of students: The challenge of a large course as ProTech is the diverse abilities of students. Therefore, it is difficult to cater for the needs of individual ones. Taking part in reflection and independent learning, students learned to set their own goals and had the sense of taking charge of their own studies, thereby enhancing learning motivation:

- “I think that I am the person who knows myself the best, so I have to learn according to my own characteristics.” (INT003)
- “Because I should be the master of my learning, and only I know myself best.” (INT004)
- “It can increase your interest in learning such a particular language because it’s not a given topic; you can choose your own topic. For example, I am interested in basketball. I can read news on ESPN, then you can just follow your own path and it’s quite interesting actually.” (INT006)

III. Students’ self-access and reflection records

In this section, I will select and discuss a verb that had a high frequency in students’ SAR records: try, with 3,075 occurrences including all its derivatives.

The characteristic feature of this verb is the intention to take part in an action; in other words, it is an intermediate category between a mental activity and a physical activity. The followings are some instances of try:

- Learning from successful speakers is a good way to enhance myself. I will try my best to be a good speaker. (SAR624)
- In the coming presentation, I will try to avoid unnecessary stop and try to make use of the technique of changing talking speed. (SAR629)
- I have checked the dictionary of the pronunciation of different words and I have rehearsed for a few times to try to be more fluent in the presentation. (SAR057)

The three examples cited illustrate some typical patterns of the use of the verb try. Example SAR624 shows the frequent construction try my best (86 occurrences) in students’ reflective writing. This usage seems to make sense as reflection leads to action plans, and the phrase implies commitments to change and improvement.

Example SAR629 illustrates another two-phrase construction that was frequently found. The structure try + to-positive action had 1,427 occurrences, with the non-finite component realized by actions such as make use of, learn, apply, etc. There were also 28 non-finite verbs exemplifying negative actions preceded by avoid or not to.

Apart from actions, ProTech students also set goals to improve their style and manner of presentations realized by adjectives such as fluent, relaxed, confident, etc., preceded by try to be (26 occurrences) as shown in Example SAR057.

These examples show the use of the present and future forms of try (2,014 occurrences) to signal plans of actions, while the use of its past form tried (1,061 occurrences) may indicate students’ reflections on how they performed in the previous presentations or their independent learning experiences:

- Different people have different ability in these areas. I believe that my group mates and I have already tried our best to give a fluent and clear speech. Indeed, there are some areas that we can improve. (SAR813)
- Besides learning the pronunciation of IPA symbols from the Web sites above, I also tried to learn the rhythm of speech by repeating what had the speaker said because I thought the speaker had performed a good delivery for me to understand the IPA lesson. (SAR302)
- Second, he tried to relate the speech to the audience and current affairs, say he talked about the movie that’s showing in the cinema or some well-known cartoon and make some jokes of them. (SAR780)

Instead of showing commitments to improvement, the phrase tried our/my best (18 occurrences) in Example SAR813 appears to show a reassurance of the efforts devoted to their technical presentation. Example SAR302 shows the student’s recount of his own learning experience, while Example SAR780 shows the evaluation of the act made by another speaker.

CONCLUSIONS

Based on the findings from the three research instruments, it can be concluded that ProTech (1) is quite successful in raising students’ awareness of the value of reflection and independent learning in the context of technical communication and beyond, (2) has, in general,
changed the students’ perceptions in terms of the ways to improve performances and the involvement of others in their learning processes, and (3) helps learners set goals to strive for improvement.

The generally positive perceptions of reflection and independent learning from the learners in this study have provided some empirical support for their integrations into the technical communication course. Further research can be undertaken to investigate the correlation between the assessment of students’ presentation performance and their SAR records.

REFERENCES


ABOUT THE AUTHOR

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