

THE EFFECTIVENESS OF A TECHNICAL COMMUNICATION COURSE IN A MALAYSIAN TECHNICAL UNIVERSITY: ENGINEERS' PERSPECTIVES

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ABSTRACT

As we progress through the 21st century, competence in Technical Communication has become a crucial requirement for all engineers. The global engineering world has created demands on engineers to be able to collaborate on cross-functional teams, manage virtual-project teams and write for multiple complex audiences. This study investigates on the engineering undergraduates' perceptions about the effectiveness of the Technical Communication course in terms of course content as well as viable suggestions to improve on the course. The instruments that were used for data collection in the study are survey questionnaires and recorded interviews. The findings of the evaluation by the undergraduates reveal that on the overall the effectiveness of the course content is at a moderate level. Thus, this is indicative of the fact that the Technical Communication course needs to be revised in terms of the course content. The respondents have also provided viable solutions to improve on the course.

Keywords: *technical communication, assessment, course content, teaching material, engineers' perspectives.*

1.0 INTRODUCTION

In this era of modernization and globalization, higher learning institutions play an important role in developing generic skills like communication skills which are desired by most employers. Without strong communication skills, engineers may find themselves at a disadvantage as they may not be able to demonstrate professional behavior and work within global networks. On-going changes and increasing globalization have increased the importance of communicating in English at workplaces both within and across boundaries (Purpura & King, 2003). According to Indira and Meenakshi Sundram (2010), the need for English has become more manifold than

it used to be as the present context is such, where today's engineers are required to communicate with more number of their counterparts across the globe.

Research shows that engineering undergraduates do not have the level of oral and written communication skills that jobs require (Norback & Hardin, 2005). Technical Communication experts too have added their voices to the commotion about how engineering students are unprepared for workplace communication upon graduating (Demasi & Gibson, 2006). Amare and Brammer (2005) add that many engineering employers complain about their new employees many of whom have taken professional writing courses and yet do not know how to write on the job. According to McKay (2007), the biannual survey reports by the Association of Graduate Recruiters extols that many engineering graduates lack 'soft skills' such as communication and 'verbal reasoning'. The Graduate Outlook Survey (2006) places interpersonal and communication skills (57.5 %) at the top of their list of criteria for the hiring of engineering graduates with academic qualifications (35.4 percent) and work experience (37.6 %).

Venkatraman (2007) elucidates that the re-examination of English Language teaching at all levels need to be implemented to ensure that language teaching activities meet the demands of the society. Azami et al (2009) too stress that engineering undergraduates need to possess attributes namely expected of professional engineers and an ability to deal with unique socio-political constraints. According to Azami et al (2009) engineering education cannot afford to be static but must be constantly reviewed and improved. Thus, continuous quality improvement has to be made a culture of engineering education.

Lappalainen (2009) calls for a concomitant change in the university curricula. This is because the engineering communities of today are becoming more diversified as a result of globalization and the accelerating technological advancement and industrial demands have not found their match in the current university education. The average university student is proficient in the English language to the extent that by no means hurdles understanding and speech production, but lacks social competencies that should be promoted in today's education supply. Lappalainen (2009) too adds that industrial operators are signaling the increasingly paramount role of interaction skills and are expressing their growing concern over competence gaps in this area.

In addition to the above, instructors who teach Technical Communication courses find students' inability to connect communication and technical

aspects. In the writing of technical reports and in oral presentations, students most often fail to demonstrate a command of expected vocabulary, error-free sentence structures and requisite grammar to communicate the material content in a proper manner. Given the above situation, this research intends to investigate the engineering undergraduates' perceptions about the effectiveness of the Technical Communication course in terms of course content and to identify viable solutions to improve on the course.

1.1 Research Questions

1. What are the perceptions among undergraduates about the effectiveness of the Technical Communication course in terms of course contents?
2. What are the viable solutions to improve on the course?

1.2 Research Objectives

The objectives of the research are as follows:

1. To investigate the undergraduates' perceptions about the effectiveness of the Technical Communication course in terms of course content
2. To identify viable solutions to improve on the course

1.3 Literature Review

Technical Communication or (TC), as a novel interdisciplinary of learning, is quite popular in American and Canadian universities. According to the data issued by the Society for Technical Communication, TC is taught as a course or specialty in over 120 universities (Duan & Gu, 2004). Technical Communication is the process of conveying technical information through writing, speech and other medium to a specific audience. It is important to engineers mainly for the purpose of being professionals.

In contemporary undergraduate engineering education, there is a seemingly irreconcilable tension between two growing needs, that is the ever-increasing body of technical knowledge that graduate students must command and the growing recognition that young engineers must possess a wide array of personal, interpersonal and system building knowledge and skills that will allow them to function in real engineering teams (Edward, 2002).

On the basis of common-core language teaching theory, the pedagogy of Technical Communication, aims at finding out the general convention that guide the style, function, discourse and rhetoric of all the technical documents, thus applying them to English for Specific Purpose (ESP) teaching practice in all specialties (Duan & Gu, 2004). Duan & Gu further reiterate that one who has mastered the general conventions in Technical Communication will be able to communicate effectively in their own profession. The challenges of grooming students for a career in technical writing can be quite daunting. Indra Devi & Farah (2008) elucidate that engineering students have the potential to become competent speakers if they're provided ample practice.

Cunningham et al., (2010) reiterate that primary pedagogical emphasis for engineering and technical communication curricula should be job-related correspondence followed by technical reports and proposals. According to Nakamura (2010), Asian economies like South Korea are increasing their presence in international business largely because they have plenty of highly motivated English-speaking employees. Meanwhile, in the Japanese context, companies' profiles in the international arena are becoming relatively much weaker because their employees' English communication skills are generally very limited. Thus, Nakamura (2010) adds that what's needed is a seamless approach to English education from university to industry where the two worlds should work together to develop a common framework for engineering students which should focus on solid communication skills. All these evidences show that the bulk of the responsibility lies on the course providers or lecturers and the course content that is being delivered in the institutions concerned.

In Malaysia, industry demands graduates with specific as well as generic skills. A study on the Malaysian engineering education model has shown that besides being technically competent, engineers need to have the interpersonal skills to deal with the public effectively. A young engineer needs to be trained to communicate effectively. In view of the above, universities need to reassess the effectiveness of the existing language programs so as to determine that the language classes adequately equip students to communicate effectively at their future workplace.

A Technical University in Malaysia

A technical university focuses on generating highly skilled engineers who have a good mastery of engineering skills which comprise both theoretical competency as well as practical competency. The graduates

in these universities can be referred to as “application-and-practice oriented engineers”. The technical university system is developed based on models such as the *fachhochschule* (FH) in Germany, the IIUT system in France, the polytechnic university system in Hong Kong and a few others. The model of education system practiced in the four technical universities in Malaysia namely, Universiti Teknikal Malaysia Melaka (UTeM), Universiti Malaysia Perlis (UniMAP), Universiti Malaysia Pahang (UMP) and Universiti Malaysia Tun Hussein Onn (UTHM) comprise general commonalities like focusing on specific engineering disciplines, spending more time in practical sessions than in lecture rooms, enhancing collaboration with industries and also emphasizing on entrepreneurship and communication skills.

Technical Communication – Course Description

This course is content-based in nature and it aims to equip the engineering students at the degree level with the necessary language skills required to write a technical research report. As this course prepares students for the mechanics of the different genres of report writing, the emphasis is more on writing skills generally and report writing specifically in order to meet the demands of the industry. It also reintroduces students to the basics of presentation skills.

By the end of the course students should be able to:

- i. Identify the different types and formats of technical reports.
- ii. Read and understand a variety of texts related to technical fields.
- iii. Write and present the various forms of technical research reports using the formats and styles taught.

The duration of the course is 14 weeks with one hour of lecture and two hours of tutorial every week. Total number of lecture hours is 14 and total number of tutorial hours is 28. Throughout the course students are exposed to technical communication, technical writing, ethics in technical writing, data gathering from multiple resources e.g. from websites, search engines, journals and magazines, elements of a proposal and the writing of a proposal. Besides, they are also exposed to ways of organizing and documenting information e.g. writing quotations, paraphrasing, synthesizing, writing in-text references and documentation as well as issues to plagiarism.

Besides, they are introduced to an overview of the technical research report, as well as the elements of a report like writing the Introduction chapter which consists of background, objectives, scope and organization, Methods, Materials and Procedures chapter, and also the chapter on Results and Discussion and Conclusion and Recommendation. In addition, aspects like writing abstracts, editing, mechanics and style in writing are also covered.

On the overall, the writing component is given a greater emphasis in this course and 40 % of the total marks are obtained via writing projects done in groups. The speaking component carries a percentage of 15. The grammatical items covered in this course are fragments, run-ons, parallelism and verb-tenses. These components are assessed via a grammar quiz which carries 10 marks. 40% of the total marks are obtained via individual attempt that is 10% for grammar quiz and 30% for final exam.

Technical Communication Syllabus

Amirian and Tavakoli (2009) made a study on the ESP courses offered to engineering students in Iran. Based on the needs analysis undertaken in this study, they designed a skills-based syllabus for in-service or pre-service ESP courses offered to engineers or would-be engineers. Amirian and Tavakoli (2009) propogate that this syllabus offers a combination of communication and language skills and is ideal for those who need to use English in an international work environment.

Subbulakshmi's findings (2008) on the analysis of the syllabus in various engineering colleges and universities like the Anna University and Pondicherry Engineering College reveal that the technical English syllabuses lack the following items: (1) conduct of aural-oral tests, (2) lack of practical orientation, (3) adoption of multi-media modules, (4) interaction and project work, (5) speaking practice – both interpersonal and presentation, and (6) equal weight for oral and written skills.

According to Subbulakshmi (2008), in the light of recent developments in applying discourse patterns to language studies, the syllabus may be oriented towards speaking and writing beyond the sentence level and rigorous application of coherence and cohesion to make effective oral and written presentations. More than grammar, logic and rhetoric should be focused on at the collegiate level.

Subbulakshmi (2008) in her needs analysis study on students in engineering colleges administered questionnaires to 500 first year

engineering students from different colleges and universities in Tamilnadu, India. The responses of the undergraduates suggested that they preferred to have variety in classroom activities. Subbulakshmi (2008) contends that this confirms Nunan's plea for a paradigm shift in pedagogy and as quoted by Nunan (1988) that, 'The learner-centered or learner-based curriculum differs notably from the traditional curriculum in that it is based primarily on collaborative progress between teachers and learners rather than on a number of rules and norms imposed from outside.'

More than 80 percent of the respondents favored the inclusion of lesson based on technical communication skills. Subbulakshmi (2008) reminds us that the English curriculum for engineers could be varied and rich. She also stresses that the learners didn't like to have texts concerned with grammar but rather expected something innovative in their Technical English program. She continues that, to the question whether traditional materials like poems/stories, spoken English to improve pronunciation and communication skills or to participate in group discussions and interviews, their instant response was for the last item, that is group discussions and interviews.

Textbooks

Hutchinson and Torres (1994) suggest that the textbook is an almost universal element of English Language teaching and no teaching-learning situation, it seems, is complete until it has its relevant textbook. Haycroft (1998) suggests that one of the primary advantages of using textbooks is that they are psychologically essential for students since their progress and achievement can be measured concretely when we use them. Litz (2001) stresses on the overall organization of textbooks which should be inclusive of learning objectives that are clear and concise, detailed overview of topics, functions, structure/grammar and skills within each unit that can be found in the introductory table of contents.

Sharwood-Smith (1988) stresses that consciousness-raising tasks in textbooks should be viewed as a facilitator to grammatical competence. Sharwood-Smith (1988) adds that contextualized practice in textbooks encourages learners to use their cognitive skills and prior knowledge to process linguistic input and create an awareness of both grammatical and lexical patterns. Besides, they add that linguistic awareness when internalized, improves ones communicative competency, fluency, linguistic competence and grammatical accuracy.

According to Gholam (2000), ESP textbooks must be geared such that they could foster students' awareness of rhetorical considerations to recontextualize such awareness both in their academic writing and other relevant contexts of communication.

2.0 METHODOLOGY

The subjects of the study comprise 240 second year degree students from the Faculty of Electronics and Computer Engineering and the Faculty of Manufacturing Engineering in a technical university in Malaysia.

<i>Age Group</i>	<i>Numbers</i>	<i>Percentage</i>
19 and 20	31	12.9
21 and 22	173	72.1
23 – 28	36	15.0
Total	240	100.0

Although the participants are still pursuing their degrees, they are referred to as engineers in this study. The reason for referring the participants in this way is because previous research on engineering students e.g. by Ingram & Parker (2002) too refer to the students as engineers. The authors contend and show sufficient evidence that the cultural practices of engineering are deeply ingrained in the standard engineering curricular. Leonardi (2003) adds that these students begin their enculturation there. Thus, they can provide particularly useful insights into the culture of engineering due to their intense immersion in it.

Previous research on engineering students by Bucciarelli & Kuhn (1997), Lougren & Racer (2000) too refer to the student participants in their study as engineers. Bucciarelli & Kuhn (1997) have made the strongest argument for studying engineering students as engineers. The authors contend that at no time in their career are engineers more strongly influenced by the culture of engineering than when they are students at a formative stage.

The sources of data are derived primarily from sources that include documents like the syllabus and textbook, feedback from students' questionnaire and feedback from interview with students.

3.0 FINDINGS

Analysis of Students' Responses Towards the Effectiveness of Technical Communication

Table 1: Students' response towards items in questionnaire - evaluation on the course content

Statements	Strongly disagree	Disagree	Agree	Strongly agree	Mean	SD
a1 - able to identify the different types and formats of technical reports.	-	<u>20</u> 8.3%	<u>176</u> 73.3%	<u>44</u> 18.3%	3.10	.51
a2 - able to identify a variety of texts related to technical fields.	-	<u>20</u> 8.3%	<u>184</u> 76.7%	<u>36</u> 15.0%	3.07	.48
a3 - in general terms, the material is uninteresting.	<u>59</u> 24.6%	<u>85</u> 35.4%	<u>78</u> 32.5%	<u>18</u> 7.5%	2.77	.91
a4 - the amount of material is inappropriate.	<u>11</u> 4.6%	<u>127</u> 52.9%	<u>85</u> 35.4%	<u>17</u> 7.1%	2.55	.69
a5 - this course is difficult in comparison to others.	<u>14</u> 5.8%	<u>99</u> 41.3%	<u>74</u> 30.8%	<u>53</u> 22.1%	2.31	.88
a6 - the course does not foster my critical thinking and problem solving skills.	<u>55</u> 22.9%	<u>106</u> 44.2%	<u>65</u> 27.1%	<u>14</u> 5.8%	2.84	.84
a7 - does not provide sufficient exposure on grammar and language conventions	<u>68</u> 28.3%	<u>93</u> 38.8%	<u>63</u> 26.3%	<u>16</u> 6.7%	2.89	.90
a8 - able to write a technical research report using the format and style taught	<u>1</u> 0.4%	<u>16</u> 6.7%	<u>178</u> 74.2%	<u>45</u> 18.8%	3.11	.51
a9 - the course has provided me with the necessary report writing skills which would enable me to meet the demands of the industry	-	<u>17</u> 7.1%	<u>161</u> 67.1%	<u>62</u> 25.8%	3.19	.54
a10 - able to present a technical research report using the format and style taught	<u>1</u> 0.4%	<u>19</u> 7.9%	<u>173</u> 72.1%	<u>47</u> 19.6%	3.11	.53
a11 - learnt the necessary language skills required to write a technical research report	-	<u>22</u> 9.2%	<u>162</u> 67.5%	<u>56</u> 23.3%	3.14	.55
a12 - the course content is not related to my specific engineering discipline	<u>80</u> 33.3%	<u>83</u> 34.6%	<u>61</u> 25.4%	<u>16</u> 6.7%	2.95	.92

Underlined figures represent number of respondents

n=240

4.0 DISCUSSION

From the analysis it is evident that a majority of the students have a positive feeling towards the course. 81.6% of the students feel that the course had helped them to identify the types and formats of technical reports and texts related to technical fields. Besides, a majority of them too feel that the course had helped them to identify the types and formats of technical reports and texts related to technical fields. They also expressed that they have learnt to write and present technical research report using the related format and style. A majority of them have also learnt the necessary report writing skills and language skills. However, more than half of the respondents do have negative feelings about the course. They feel that the course is difficult in comparison to others. Almost half of the total number of respondents feel that the material in the course is uninteresting and inappropriate. They had requested for course content that is more challenging and interesting.

Qualitative data shows that students have requested for more grammar practice, more activities on oral communication and exposure to good presentations and field trips to industries. This confirms Norback & Hardin's findings (2005) that engineering students struggle with their writing because they have nothing to emulate and are deprived of concrete examples from companies. Thus, this kind of exposure is in line with the students' request. Besides, they have also requested for more exercises to be included in the textbooks and for more individual assignments rather than group assignments. In short, their responses reflect that the course content needs to be revised.

A majority of the students request that the course should provide more oral practice rather than focusing mainly on the writing of the Technical report. Students suggest that they need oral practice to be able to speak fluently and confidently in public. This concurs with Nakamura (2010) who states that there is a pressing need to improve active skills namely speaking and whether students have English skills or not is changing from an opportunity factor to threat when they cannot speak English in the international business world.

The respondents had also requested for more grammar items and practice. This is consistent with Wiwczarowski (2009) who demands that students need to be exposed to intensive grammar and language exercises so that they can maintain the requisite grammar and fluency in their technical reports and oral presentations.

4.1 Analysis of Level of Effectiveness

Table 2: Analysis of mean and level of effectiveness of the technical communication course in terms of course content

	Mean	SD	Level
Evaluation of the course content	2.92	0.36	Moderate

Table 2 shows the analysis of the mean scores and the level of effectiveness of the course content based on the response provided by the students. Finding in the table shows that the level of students' evaluation on the course content is at a moderate level with a mean value of 2.92. This implies that necessary measures need to be taken to improve on the course content.

5.0 CONCLUSION AND IMPLICATIONS

A major implication of this study is that it had provided valuable inputs from undergraduates in evaluating the effectiveness of the Technical Communication course and also in identifying areas that need more attention. The findings have also provided information that would help to revise the course content meant for these engineering undergraduates.

Thus, this study reveals that the following items need to be emphasized in the development of an improvised course:

1. Maintain ties with industry.
2. Execute equal weight for oral and written skills.
3. Give importance to speaking and writing skills.
4. Administer aural-oral test.
5. Apply discourse patterns to language study and write beyond sentence structure level to produce effective oral and written presentations.
6. Maximize grammatical input (Grammar Handbook).
7. Reduce group assignments and add individual assignments.
8. Expose students' real life and recorded industrial talks, conference presentations, samples of technical reports and documents from industry.
9. Enhance use of audio-video materials in teaching.
10. Provide interactive task based on realistic situations that are related to the workplace.
11. Encourage blended learning (infusion of ICT in learning).
12. Organize field trips/visits to industries.

Technical Communication has come to be regarded as an integral part of the engineering curriculum in light of the move towards prioritizing communication skills within the engineering fields and also with the boom in engineering studies in Malaysia as well as in the global context. A symbiotic relationship between academia and industry is relevant to enhance the effectiveness of the teaching and learning of Technical Communication at the collegiate level. An evaluation as carried out in this study is indeed deemed crucial as it enables course instructors and stakeholders to take the necessary measures to review the course content. It is hoped that this study would be a driving force behind the implementation of a new revised Technical Communication course for engineering students in technical universities.

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