

The Technical Oral Presentation Skills and Attributes in Engineering Education: Stakeholder Perceptions and University Preparation in a Malaysian Context

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***Abstract:** Engineer workplace communication expectations are multifold as a result of globalization and rapid technology advancement as engineers are expected to communicate “with international partners across the borderless professional global village and community” (Patil, 2005: 49). Engineers of the 21st century need to possess an adequate knowledge and understanding of stakeholders (members of the academic and business/professional community) perception of effective communicative competence in “presentation skills” and “attributes” required in technical oral presentation (TOP). Technical oral presentations are frequently practised workplace communicative event (Crosling & Ward, 2002). This paper presents a research study conducted at a Malaysian university to capture the stakeholder views of effective communication skills and presenter attribute requirements for technical oral presentation. The study is based upon the Final Year engineering project (technical presentation) as its platform to elicit views of the academic and business/professional community involved in evaluating the communicative event. Both quantitative and qualitative findings are presented and described in the paper. The paper also discusses the pedagogical implications toward effective participation in the discourse community.*

Introduction

The paper presented is an outline and findings of a research study conducted in a Malaysian university. The primary objective of this study is to identify the perceptions on communicative competence among the members of the academic and business/professional community on technical oral presentation. The notion of communicative competence in “presentation skills” and “attributes” is investigated according to the use by the academic discourse community (like students, academic staff, research project supervisors and language teachers in engineering education) and professional engineering community (like professional engineers and industry practitioners). All respondents targeted in this study were directly or indirectly involved as examiners in the final year engineering project presentation or final year project 2, commonly referred to as FYP 2. The quantitative and qualitative key findings of the research are briefly presented and discussed in the paper.

Rationale

Workplace communication studies indicate that employer demands placed on effective presenter skills and attitude required of engineers of the 21st century far differ from that of the 1990's as a result of globalization and industrialization in the new millennium (Nguyen, 1998; Patil, 2005; Radzuan, N. R. M., Ali F., Kassim H., Hashim, H., Osman, N., & Abid, R., 2008; Schnell, 2006; Thomas, 2007). Today's global workplace engineering professional skill and attribute requirement are a result of the

“globalization of engineering education and the increasing mobility of engineering professionals around the world” (Patil, 2005: 49).

Engineers multi-task and are required to deal with various workplace communicative events (meetings, discussions, presentations, advice) at both formal and informal settings (Tenopir & King, 2004: 28). As engineers spent about “58% of their time communicating” (Tenopir & King, 2004:30), it is essential that graduates be equipped with effective communication skills and attitude for workplace participation. Crosling & Ward (2002) identified presentation as one of the various workplace oral communication activities performed by engineers (cited by Eunson, 2008).

Engineers need to be proficient as presentation skills are an important workplace communicative event (Bhattacharyya, Nordin & Salleh, 2009; Norback & Hardin, 2005). The researchers’ interest in this study stems from the global concern over graduates lack of communicative competence in workplace communicative events as experienced in the Malaysian setting. (Tan, 2008; Tay, 2008). If graduate communicative competency is left unchecked, nation building plans (Ninth Malaysia Plan, 2006-2010; Vision 2020) will probably not materialize due to insufficient human capital.

Technical Communication and Presentation in Engineering Education

Technical communication, an offshoot of English for Specific Purpose (ESP) pedagogy, is communication about “scientific, engineering, technological, business, regulatory, legal, managerial, or social scientific information” (DiSanza & Legge, 2003:198). A technical presentation, refers to “a prepared formal presentation on scientific, engineering, technological, business types, regulatory, legal, managerial, or social scientific information topics to non-expert audience” (DiSanza & Legge, 2003). A variety of common presentations that fit under the rubric of technical communication, include laboratory presentations, feasibility reports, progress/status reports, survey presentations, training lectures, and business reports (2003:198). In this context, the students’ final year engineering project presentation is a form of technical oral presentation in technical communication. The objective of the study is to elicit the stakeholder views of effective communication skills and presenter attribute requirements in technical oral presentation. The stakeholder views on communicative competence requirements in technical oral presentation provides suggestions to enhance ESP language learning materials and lessen the existing academia-industry practitioner divide prevalent in oral communication studies (Norback & Hardin, 2005).

Research Methodology

The study was conducted at Universiti Teknologi PETRONAS (UTP), a private technical university located at Bandar Seri Iskandar, Perak Darul Ridzuan, Malaysia. Respondents were final year engineering students from the Mechanical Engineering (ME), Chemical Engineering (CHEM), Civil Engineering (CVE) and Electronics and Electrical Engineering (EE) program. The study took on a mixed method approach which obtained qualitative inquiries from selected students, internal and external examiners involved in the final year engineering project presentation.

A set of questionnaire was distributed to 240 randomly selected respondents. 83.3% of the questionnaires (200 respondents) were returned back to the researchers. Most of the respondents had completed Professional Communications Skills (PCS), a speaking course which contributes to 89% of the total population, while 6.5% had not taken the course and 4.5% were currently taking the course. Table 1 provides the breakdown of the total number of respondents by gender from each engineering program.

Table 1: Sample details of respondents participated in the study

STUDENTS		BACHELOR OF ENGINEERING PROGRAMME				TOTAL
		ME	CHE	CVE	EE	
Gender	Male	74	22	27	2	125
	Female	8	40	26	1	75
TOTAL		82	62	53	3	200

A questionnaire comprising 65 items adapted from (Morreale et al. 1993; Miller et al. 1996; Dyke, 2006) was used in this study. The questionnaire comprised of five sections namely, Section A, on student demographics, Section B on final year technical oral presentation while Section C listed presenter skills and attribute items required in a technical oral presentation. For Section D, the items were on language and non-verbal skills in technical oral presentation while Section E was on university preparation for technical oral presentation. To obtain feedback for Section C and D, a 5 point Likert scale ranging 1 to 5 (where “1” indicates “strongly disagree” to “5” for “strongly agree”) was utilized for frequency on presentation skills and attributes. To test the reliability of the scales used, Cronbach’s Alpha was applied to estimate the internal consistency of the dimension to measure the reliability of the items (Hair et al. 1998; Malhotra 2004). The alpha values of the said dimensions of the questionnaire are displayed in Table 2.

Table 2: Cronbach Alpha Values of Each Dimension

DIMENSION	Presenter Skills & Attributes	Language Skills	Non Verbal Attributes	University Preparation
Alpha Values	0.95	0.89	0.85	0.70

Thus, with alpha values ranging from 0.70 to 0.95, the scales in the study can therefore be considered as reliable. Semi-structured interviews were also conducted with selected participants from the said community to provide further in-depth explanation of views on communicative competence of technical oral presentations. Feedback was obtained from the participants with regard to the university practices and preparation required for effective technical presentation.

Research Findings

The research findings of this study provide valuable insight on engineering students’ perceptions about effective presenter skills and attributes required for the successful delivery of technical oral presentations. The three dimensions in final year engineering project presentation include:

- Presenter skills and attributes which emphasized on technical competency, methodology, organisation, layout, visual presentation, audience analysis, interaction with audience, presentation skills, delivery, clarity, creativity, confidence, fielding questions and humour
- Language skills which focussed on usage of complex terms, grammar, pronunciation, technical jargon and diction
- Non-verbal attributes which included eye contact, stance, vocal variety, vocal fillers and culturally observant

The findings also identified if the university preparation was adequate to meet professional workplace communication needs.

Quantitative analysis

Finding 1: Presenter skills and attributes

For the first dimension on presenter skills and attributes, engineering students are of the opinion that such skills and attributes enhance the effectiveness and delivery of a presentation. The students’ are of strong agreement and consensus that effective presenter skills and attributes are a combination of several items such as listed in Table 3 below.

Table 3: Presenter Skills and Attributes in Technical Oral Presentation (in %)

PRESENTER SKILLS AND ATTRIBUTES (in %) (From Highest To Lowest)					
ITEMS	strongly agree	agree	undecided	disagree	strongly disagree
Confidence Level	51.0	41.0	5.0	3.0	0
Methodology	41.5	48.0	9.0	1.0	0.5
Visual Presentation	40.0	51.0	7.5	1.5	0
Audience Receptivity (technical jargon)	38.0	52.0	10.0	0	0
Visual Appeal	35.5	54.0	9.5	0.5	0.5
Presentation Skills: Analogy	34.0	58.5	7.0	0.5	0
Delivery Style	32.5	51.0	14.5	2.0	0
Audience Receptivity (non-technical jargon)	32.5	47.0	18.0	2.5	0
Synthesize Contents	31.0	56.5	12.5	0	0
Technical Competency	29.0	59.0	12.0	0	0
Organization	28.5	57.0	14.5	0	0
Creativity	23.5	54.5	19.5	2.0	0.5
Question and Answer	22.0	61.0	15.5	1.5	0
Humour	16.0	40.5	35.5	7.0	1.0

In this dimension, students have highly rated the first three items, namely, confidence Level, methodology and visual presentation (above 40%). Out of 14 items, confidence level is rated highest while humour is rated as the lowest. This finding echoes communication studies findings (Almeida, 2004; Darling & Dannels, 2003) with similar emphasis on confidence and use of chosen genres in the delivery of presentations.

Finding 2: Language skills requirement

In addition to the presenter skills and attributes, the students are also of the opinion that for effective and succinct technical oral presentations to occur, presenters must possess adequate language proficiency as itemised in Table 4 below.

Table 4: Language Skills in Technical Oral Presentation (in %)

LANGUAGE SKILLS (in %) (From Highest To Lowest)					
ITEMS	strongly agree	agree	undecided	disagree	strongly disagree
Avoid Complex Terms	40.0	50.0	9.5	0.5	0
Pronunciation	31.0	61.0	8.0	0	0
Diction	27.5	66.0	6.0	0.5	0
Enunciation	26.0	61.0	12.0	1.0	0
Language Choice	24.0	64.0	9.0	3.0	0
Articulation	23.5	60.5	15.5	0.5	0
Grammar	19.5	55.0	20.0	5.0	0.5

This finding indicates the importance to avoid use of complex items and correct pronunciation for technical oral presentations to be effective. These two items have been rated at 50% agree and 61% agree respectively. Other items of language skills proficiency such as, diction, enunciation, language choice, articulation and grammar, have been rated around the same level (19-28% strongly agree and 55-66% agree). This feedback indicates the students' perception of crucial language related items required in presentations.

Finding 3: Non-verbal attributes and skills

The third important dimension mentioned in ensuring the effectiveness of technical oral presentation as perceived by the students' is that of non-verbal attributes and skills as displayed in Table 5.

Table 5: Non-Verbal Attributes and Skills in Technical Oral Presentation (in %)

NON-VERBAL SKILLS AND ATTRIBUTES (in %)					
(From Highest To Lowest)					
ITEMS	strongly agree	agree	undecided	disagree	strongly disagree
Rate/Pace	34.5	57.0	8.5	0	0
Appear Extemporaneous	33.0	53.5	11.0	2.0	0.5
Volume	32.5	57.5	9.5	0.5	0
Facial Expressions	32.0	51.5	15.0	1.5	0
Stance	30.0	56.0	12.5	1.5	0
Non-Verbal Gestures	28.0	56.0	14.5	1.5	0
Vocal Variety	27.0	59.0	11.5	2.0	0.5
Pause	26.0	53.0	18.0	2.5	0.5
Vocal fillers	19.0	50.0	26.5	3.5	1.0

In non-verbal skills, the first three most important aspects of importance rated by the participants are Rate/Pace (57% agree, 34.5% strongly agree), Appear Extemporaneous (53.5% agree, 33% strongly agree) and Volume (57.5% agree, 32.5% strongly agree). This finding is indicative of oral communication studies such as that of Moretto 1996; Campbell et al. 2001, Palmer and Slavin, 2003 as cited by Radzuan, Ali & Kassim, 2008 which concur on the importance of “body language, tone, eye contact, movement, voice projection, facial expression, volume and speed, articulation and pronunciation, correct grammar and style, vocal variety” as some essential aspects in evaluating technical oral presentations (Radzuan et al. 2008: 6). The feedback enables language communication lecturers to understand the students' perceptions of important non-verbal aspects required for successful delivery of technical oral presentations.

Finding 4: University Preparation

Students expressed overall satisfaction with the language input provided. Findings suggest improvements can be enhanced to the existing language courses offered in the university to meet workplace expectations. The findings provided by majority of the students suggest that they are satisfied with the oral English language course (83.5%) while 73.5% are satisfied with the written English course offered in the university. At the same time 95.5% express their satisfaction on emphasis on language input received in the university. However, the findings also indicate the need for consideration to enhance the existing written courses which may call for increase in the teaching and learning of written input required in technical oral presentations.

Qualitative analysis

The researchers also interviewed ten volunteers from the questionnaire respondent group to obtain in-depth views on the importance of communication and presentation skills required in technical oral presentation. At the same time, ten engineering lecturers and ten professional engineers also shared their views on effective technical oral presentation. Some of the key findings of the qualitative feedback are discussed below.

A comment by student A was:

My overall opinion of a good or effective presentation is dependent on the “presenter's confidence.

This means that speaker confidence is an essential skill required for effective presentation. This student emphasized on the presenter's convincing ability to ensure that the audience understands a

presentation. The student also mentioned the importance of fielding questions posed by the audience. The student's view confirms the quantitative finding on confidence level and audience receptivity as seen in Table 1.

Feasibility and cost effectiveness of a chosen material were some of the factors as mentioned by Student B. This perception is reflective of a participant in the professional engineering community of practice where decisions are economic and profit laden for the benefit of the organization. The student's views corroborate with the quantitative finding where synthesis of contents (see Table 3) and language choice is important in explaining a project (Table 4).

Student B commented that:

Knowledge of the cost factor is helpful in a presentation that entails a varied audience. The economic knowledge is useful to justify the product or material being presented. A student must try to provide reasons for his or her choice in an experiment. This knowledge is useful when being questioned by the examiners from the industry and academia.

This feedback shows that in some cases, a presenter must be prepared to enhance and apply “real life application” and “cost elements” to a project presentation for the benefit of the audience knowledge and probable decision-making purposes.

In an interview with Lecturer A, the comment was:

Positive attitude, proactive approach and initiative are essential attributes for a confident presentation. 'Passion' and 'commitment' are essential driving force for students' effective delivery in presentation. The enthusiasm and responsibility is also projected in the students' timelines in frequent meetings with the supervisor.

This feedback enhances speaker confidence and presenter attitude as mentioned in Table 1. The lecturer also mentions the importance of students' ability and awareness in using “technical jargon” with a varied audience as “different implications can arise when such terms are used with a technical audience or otherwise”. This finding confers with audience receptivity when using technical jargon.

One engineer employee (Engineer A) commented that:

The student's ability in understanding a topic is an essential element of importance to enable a student to present convincingly to his audience as this allows the student to capture the bigger picture and not look at an issue from a microscopic level. Students can also overcome their nervousness if they are able to understand a particular product/issue from a broader perspective.

This finding strongly supports views and feedback of the student A, who reiterates similar importance on audience receptivity (see Table 1). From an employers' perspective and perception, it is essential that a presenter is able to understand an issue from a broad perspective and utilize critical and creative thinking while presenting.

Conclusion and Future Work

The findings has attempted to provide useful insights of communicative competence requirements of different discourse communities (like students, academic lecturers or employers), which may reflect the perception of a said participant in a particular discourse community. The findings are useful to suggest enhancement in the teaching/learning and development of ESP materials so that each participant of a discourse community can achieve their own goals for effective workplace participation. Students' feedback reveals positive indication with a call for enhancement in the current written and oral language courses offered in the university. Language courses need to theorize workplace communication skills and attributes to ensure that “real life” and “authentic” learning takes place in the classrooms as “students require new skills to flourish in tomorrows' workplace organizations” (Thomas, 2007: 294). With closer collaboration between the engineering community

and academia on written and oral communication pedagogy, it is envisaged that students will develop necessary communicative skills required for effective communication in the 21st century workforce.

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