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Communicative Competence: Novice versus Professional Engineers' Perceptions

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***Abstract*—**The notion of communicative competence has been deemed fuzzy in communication studies. This fuzziness has led to tensions among engineers across tenures in interpreting what constitutes communicative competence. The study seeks to investigate novice and professional engineers' understanding of the said notion in terms of two main elements of communicative competence: linguistic and rhetorical competence. Novice engineers are final year engineering students, whilst professional engineers represent engineers who have at least 5 years working experience. Novice and professional engineers were interviewed to gauge their perceptions on linguistic and rhetorical features deemed necessary to enhance communicative competence for the profession. Both groups indicated awareness and differences on the importance of the sub-sets of communicative competence, namely, rhetorical explanatory competence, linguistic oral immediacy competence, technical competence and meta-cognitive competence. Such differences, a possible attribute of the learning theory, inadvertently indicate sublime differences in the way novice and professional engineers perceive communicative competence.

***Keywords*—**Communicative competence, technical oral presentation, linguistic competence, rhetorical competence.

I. Introduction

COMMUNICATIVE competence remains a controversial and fuzzy term in the field of general and applied linguistics [1,2]. Till date it lacks definitional consensus in its construct and theoretical underpinning due to its complexity in ascertaining elements that constitute its construct [3]. The construct becomes more perplexed in its definition when perceived by participants from different communities of practice (COP), such as that of the academia and professional engineering community who form their own perception of the said construct.

The perplexity in defining the communicative construct is further amplified when members of the COP are laden with their own perceptions. Perception is defined as a state of "consciousness": a mental image, concept derived by direct, intuitive or cognitive manner" [4]. In the context of this study, perception refers to the way human beings organize and interpret certain views into experiences (images) which is tied to one's past experiences, beliefs and expectations. This study focusses on selected academia-industry practitioner perception of communicative competence who share an interest in technical oral presentations.

Literature indicates the apparent academia-industry practitioner divide over communication skills requirement for workplace technical and scientific oral communication needs [5,6,7]. Why does the apparent divide over communication skills persist among the said practitioners? The study is timely as it seeks to ascertain the views held by respective practitioners ie students or novice engineers and professional engineers involved in the business of technical oral communication vis-à-vis, technical oral presentations. In particular, the unit of analysis is the critique session within a technical oral presentation. Engineers are involved in many communicative events and presentations form one of the many communicative events practiced by engineers at the workplace [8].

Within presentations, critique or question-answer sessions have been deemed worthy units of analysis as such presentation practice platform sessions bring together the views of "technical and non-technical experts who make some sense out of the participants meaning making"[9]. Such critique sessions revert to Bordieu's concept of "field and habit" which mirrors Wenger's situated learning theory [10] of the legitimate peripheral participation in a said community of practice [11].

Thus, critique sessions within technical oral presentations have been identified as opportune platform to garner novice and professional engineers perceptions of the notion on communicative competence. Till date, the said notion has been deemed a fuzzy concept and lacking in its operational definition [2]. There is a compelling need to decontextualize the notion of communicative competence from a stakeholder perspective, so that each member of the society is able to attain their own goal. In a broad sense, communicative competence has been associated with "one's adaptation of a communication situation by demonstrating skills in appropriating knowledge relevant to the communication situation and context"[12]. Incorporating the theoretical underpinnings of the learning theory [10], the study attempts to situate novice and professional engineers views of the said construct from a linguistic and rhetorical perspective, an area deemed lacking in research [13]. Such is the aim of the study.

II. Literature Review

In the light of globalization, competency requirements of prospective engineering graduates far differ from those of yesteryears [14]. Engineers of today are expected to "be literate in information and communication technologies,

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coupled with associated cognitive skills and be able to keep abreast with new developments…"[14]. Engineers need to have a balance of both technical and non-technical skills for effective workplace global participation.

A balance of both set of skills enables an engineer to participate effectively in the global arena as well as meet competitive workplace demands. Gone are the days when engineers could solely specialize in one field. Modern-day engineers are expected to multi-task in various fields. Figueiredo [15] states the multi-dimensional and interdisciplinary relationship of the engineers as "…a professional who combines, in variable proportions, the qualities of a scientist, a sociologist, a designer and a doer..."[15].

In other words, 21st century engineers are expected to possess both hard (technical) and soft (interpersonal) skill. Hard skill encompass technical and content mastery while soft skill incoporates the non-technical element such as communication skills, decision making skills and other interpersonal attributes like teamwork [16]. In fact, 21st century competencies indicate effective communication, digital age literacy, inventive thinking, and high productivity as essential skills to sustain a competitive market player [17]. Related competency challenges are experienced in the Malaysian shores [5,18]. If graduate competency requirement is left unchecked, nation building efforts may not materialize due to limited human capital [19].

The awareness to develop a holistic individual equipped with competency requirement is resonated by professional engineering organizations like the Accreditation Board of Engineering (ABET) and Engineering Criteria 2000. These professional organizations accord high importance to communication skills as a result of its pedagogical shift toward learner centered Outcome Based Education (OBE). In fact, one of the OBE learner outcome stipulates the need for engineers to "communicate effectively"[20]. Hence, renewed efforts are required to enhance communicative competence among engineering graduates to meet workplace and industry expectation.

In this context, focus is directed toward linguistic and rhetorical competence, an area deemed less explored in the field of language and communication [13]. Linguistic competence refers to oral language demands and language style indicated by oral immediacy competence features in project presentations. Oral immediacy competence relates to use of interactive language and visual language. Interactive and visual language is enhanced through the "you approach" which initiates connectedness with the audience [21].

Linguistic competence incorporates technical and meta-cogntive competence. Technical competence refers to the presenters' linguistic ability to use and master technical jargon in a presentation. A technically competent presenter provides methodological explanation, justification and utilizes technical terminology within the engineering discipline. At the same time, a communicatively competent presenter must elucidate meta-cognitive competence. Meta-cognitive competence is marked by the use of presentation language that depicts "one owns' cognitive processes and products or anything related to them"[22].

Rhetorical explanatory competence encompass justification skills, interpretive skill, contextualization skill, application skill, decision making and evaluation skill. Rhetorical style indicates use of personalized language patterns, analogy, and social motivation in a project presentation. Rhetorical style deals with language that "show" and "tell" to evoke emotions and convey descriptive meaning to the audience [23]. Style is depicted by the presenters' mastery of word choices to punctuate or emphasize a viewpoint.

Linguistic and rhetorical forte is necessary for presenters to acquire the communicative competence to eventually "speak like a designer" [24]. With the apparent lack of emphasis toward specific genre in English for Specific Purposes (ESP) materials [25], this study is a step forward to investigate the linguistic and rhetorical competence features necessary in technical oral presentations. Presenters are expected to acquire that linguistic prowess and communicative ability to eventually "talk like an engineer"[26].

In the context of this study (which is part of a larger study), the research question attained through the qualitative findings is:

1) What are the novice (students') and professional engineers perceptions of communicative competence in technical oral presentations from a linguistic and rhetorical perspective?

   a) What are the similarities between novice and professional engineers perceptions on communicative competence in technical oral presentations from a linguistic and rhetorical perspective?

   b) What are the differences between novice and professional engineers perceptions on communicative competence in technical oral presentations from a linguistic and rhetorical perspective?

III. Methodology

In the qualitative stage of this study, 26 novice (students') and 12 professional engineers involved in technical oral presentations were selected by the snowball technique sampling. The qualitative phase was conducted to gain an "emic perspective" and "words of the participants" to understand the notion from an insider perspective [27]. Semi-structured interviews are chosen as this form of interviewing provided the flexibility to rephrase questions to ensure correct interpretation of the questions.

Interviews enable researchers to explore the "range of opinions, the different representations of an issue, and is not centered on counting opinions of people"[28]. Interviews were chosen as "the researcher can listen carefully to what people say or do in their life setting" and "position themselves" in the research to "acknowledge how their interpretation flows from their own personal, cultural, and historical experiences"[29].

Prior ethical sanction was obtained to conduct the said study from the novice engineers of the university and selected engineers from a national oil company. Participants were notified that interview sessions would last for 40 minutes to an

hour. In cases where clarification was required, loosely structured interviews were carried out. At the onset of any interview sessions, both researcher and participant would sign the letter of consent and provide informed consent to conduct the interview. All participants volunteered and indicated their willingness to share their experiences in technical oral presentations.

During the interview, participants were required to comment on presenters' language and rhetorical skills, preparation and challenges in technical oral presentations. The interview session enabled the researcher to gain insight of the participants' linguistic and rhetorical perspective of technical oral presentations. Although generalizations cannot be assumed in such research design, an insight of the said construct is gained from the participants' perspective.

Qualitative feedback was transcribed and thematically analyzed using Creswell's [30] theoretical framework for analyzing qualitative data. Creswell [30] theoretical framework for analyzing qualitative data whereby the generic process of data analysis include six main steps like "organizing and preparing the data; reading through all data; coding; narrating descriptions and themes; and interpreting data"[30].

In addition, the Computer Assisted Qualitative Data Analysis Software (CAQDAS) NVivo version 8 was used to statistically analyze the qualitative responses. The text was divided to small units followed by "labeling the exact words of the participants by hand or electronically by software data analysis program"[31]. Percentages were tabulated to indicate the level of agreement and tensions among the novice and professional engineers on the linguistic and rhetorical competency requirement in technical oral presentations.

IV. Findings and Discussion

Although all participants convey consensus on the importance of the said competencies, it is evident that certain competencies are more important to one community of practice over another. The tension in competency requirement affirms the differences in perceptions held by novice and professional engineers. The four dimensions discussed include rhetorical explanatory competence, linguistic oral immediacy competence, technical competence and meta-cognitive competence. Some of the qualitative responses are as follows.

Theme 1: Rhetorical explanatory competence

Both groups acknowledge the importance of rhetorical explanatory competence as a feature to denote communicative competence. Fig. 1 indicates the groups' level of agreement on the inclusion of rhetorical explanatory competence.

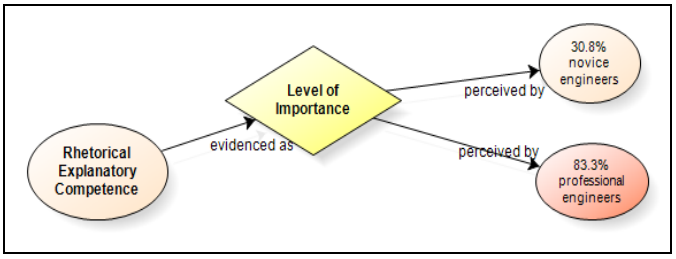

Fig. 1 Novice and professional engineers' perception toward rhetorical explanatory competence

Fig. 1 shows that 83.3% professional engineers and only 30.8% novice engineers indicate agreement on the inclusion of the said dimension as part of the communicative competence construct. As mentioned, the categories attributed to the said dimension include justification, rationalization, interpretation, and clarification.

Novice engineer A indicates the importance of justification skills and rationalization ability in a presentation in the following statement

> *"...why did I make these decisions and after making the decision, what did I do to make this thing work…"*

For novice engineer A, communicative competence is exemplified when a presenter has the ability to justify and rationalize certain decision making. The ability to provide critical defense in decision making is considered an essential competency skill requirement among engineers in the workplace [16].

Professional engineer 1 shares a similar comment,

> *"..my question will be on the quality of the research itself, the results, the methodology, how they come up with the results and how they compare the results with established literature; and how they explain all the deviation..."*

Presenters' must provide detailed methodological explanation. Professional engineer 2 affirms the view by stating

> *"…I just want to know whether its' wrong and why was it wrong; so you got to be able to explain to the masses…"*

Clearly, professional engineers accentuate presenters' clarity to provide justified explanation on certain findings. Both focal groups' agree on the importance but professional engineers stress outweigh that of the novice engineers. Professional engineers accentuate rationalization and methodological clarification as important criterion to exemplify communicative competence.

Theme 2: Linguistic oral immediacy competence

In terms of linguistic oral immediacy competence, both novice and professional engineers concur on the importance of this feature as part of communicative competence. Fig. 2 indicates both groups level of agreement on the said feature.

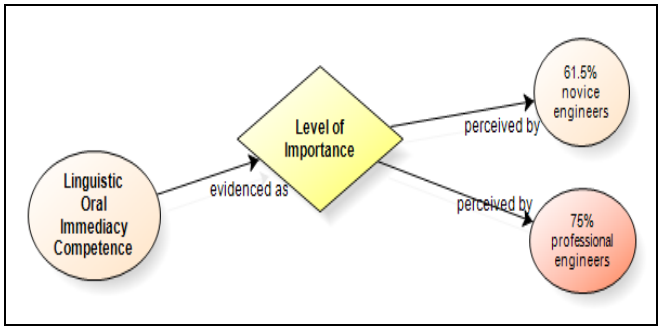

Fig. 2 Novice and professional engineers perception toward linguistic oral immediacy competence

As for Fig. 2, 61.5% novice engineers indicate agreement on the inclusion of linguistic oral immediacy competence. 75% professional engineers accord similar consensus. Visual and interactive language creates immediacy with the audience. Such phrases like "in *this* line.." or "*..this graph* indicates..." allow audience to "feel psychologically closer" to the presenters and project [32].

Novice engineers resonate the importance of language choice. Novice engineer B makes a comment that presenters

"*...must speak technically, in civil engineering language…*"

Novice engineers agree that genre used must reflect that practiced at the workplace. 75% professional engineers agree that oral immediacy is marked by the presenters' confidence in the use of language [33].

Professional engineer 3 concurs by stating,

> *"...you can see the confidence how they already speak about it; and you can see crystal clear the problem; how they explain step by step about it; they must able to interpret to all clearly, and I can understand the problem when he explain it to me very clearly…"*

Undeniably, a presenter's confidence is marked by the certainty and self-assuredness to use the genre and professional language in its rightful context. The presenter is communicatively competent when able to provide clear, detailed and methodological explanation without hesitation. Professional engineers look out for such competency skills [34]. Unquestionably participants from both focal groups recognize the importance of oral immediacy competence to create that two-way interaction required in speaking [35].

Theme 3: Technical competence

Novice and professional engineers indicate consensus on the importance of technical competence as a construct of communicative competence. Fig. 3 provides the groups' perception on technical competence.

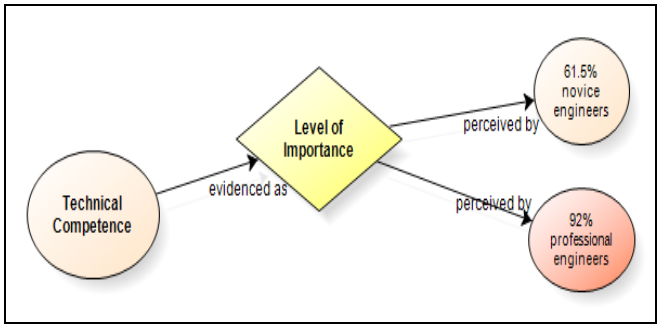

Fig. 3 Novice and professional engineers perception toward technical competence

In Fig. 3, 61.5% novice engineers indicate agreement on the inclusion of technical competence while 92% professional engineers accord similar conformity. In this context, technical competence implies use of technical jargon and non-technical terminology, technical and scientific evidence, methodological explanation of a technical problem and functional and contextual application of a problem statement.

The importance of technical mastery is voiced by novice engineer C in the said account,

> *"…the most important thing is to explain the topic as best you can, use technical term but make sure behind technical term that must be simple term of the meaning…"*

Novice engineers are aware of the importance of technical knowledge, terminology and associated terms related to the said topic. Professional engineers atest similar perception of the said construct. Professional engineer 4 states technically competent presenters are

> *"...ones who shows that their papers are based on certain technical postulations which have to be technically proven either by experimentations, simulations…"*

Professional engineers consider presentations successful when technical presenters provide technical and scientific experimental analysis to support a purported finding. Organizations seek presenters who effectively employ a wide array of technical terminology and engineering related expressions. Such perception is echoed in communication curriculum studies which eventually aim to empower novice engineers to "talk like an engineer"[25].

Theme 4: Meta-cognitive competence

As for meta-cognitive competence, participants from both focal groups also indicate favourable response to the inclusion of such descriptor as part of communicative competence construct. Fig. 4 shows the novice and professional engineers' perception of the said competence.

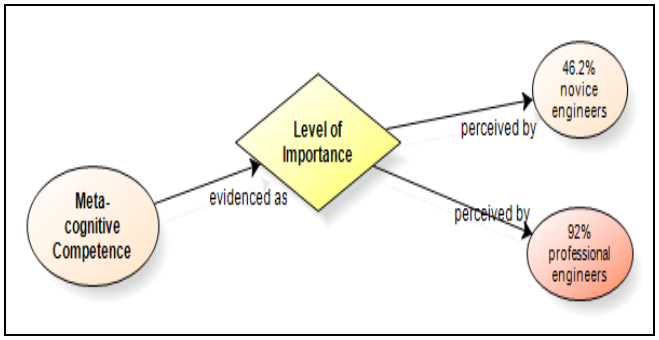

Fig. 4 Novice and professional engineers' perception toward meta-cognitive competence

As for Fig. 4, 46.2% novice engineers agree on the importance of meta-cognitive competence while 92% engineers share the same perception. Meta-cognitive competence deals with presenters' ability to contextualize, conceptualize and rationalize the analytical significance of the project. Studies indicate critical thinking as a key competency requirement for engineers of the 21st century[36].

Novice engineer D remarks that presenters' need to substantiate ones' finding with relevant literature. The novice engineer mentioned,

> *"...I validated my input with added data from other government departments…"*

Such verification enhances presenter credibility from a critical and analytical stance as the presenter relates current study needs to existing studies in the field. 21st century professional engineers expect this criterion from presenters [16]. Professional engineer 5 states,

> *"...it's not really about right or wrong; but the student must know why this happens; understanding is important; the student must know why this happens…"*

Evidently, meta-cognitive competence is a vital skill for presenters' to apply in presentations. Reports continue to convey the lack of such skills among prospective graduates [37]. Such competence allow presenters to validate, substantiate and articulate critical judgment in decision making during the tenure of a project.

V. Conclusion

Clearly, different focal groups have different emphasis on the sub-sets of communicative competence. The findings suggest similarities among novice and professional engineers on the agreement of linguistic and rhetorical competencies. However, tensions occur in the levels of importance accorded by participants of both focal groups. In all four sub-sets of communicative competence, professional engineers have indicated a higher level of receptivity toward linguistic and rhetorical devices necessary for technical oral presentations. Such differences are reflective of Lave & Wenger's theory of learning [27].

However, what emerges from this study is the professional engineers' receptivity toward linguistic and rhetorical competence. With time, professional engineers' perceptions have changed and now recognize the importance of linguistic and rhetorical features to acquire communicative competence in a technically inclined discipline.

Communication skills disparity between novice and professional engineers can be lessened if continued collaborative efforts by language and communication experts, curriculum designers, policy makers and industry practitioners are met. Collaborative efforts such as industrial training, authentic workplace project presentation, mock critique presentation sessions and discussions are pathways to attain the desired goal of communicative competence among human capital.

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