Bringing The Outside World In: Using Mixed Panel Assessment Of Oral Presentations With Electrical and Electronic Engineering Students

***Abstract*— Engineering students have been portrayed as having poor oral communication skills despite oral communication competence being a key factor in future career success. With the aim of equipping students with attributes identified as important for Engineering graduates this paper presents a research project carried out at the University of Nottingham Ningbo China in the Division of Science & Engineering with Electrical and Electronic with undergraduate students, focusing on the use of a mixed specialist and non-specialist audience for students' end of semester oral presentations assessment.**

It is known that oral presentations are an important academic genre developing communication skills and confidence in students but it is an area which has been found to be lacking in traditional engineering courses. The innovation of the mixed panel was to help prepare students for life after university by giving them experience of pitching technical material appropriate to the knowledge of the audience, which is something they will have to do when working in companies or on projects.

This paper outlines the experience from the perspective of the assessors from different disciplines who were interviewed to determine what they were looking for in the presentations. It will also review the experience of the students themselves, based on a survey which considered the impact the mixed audience had on their presentation preparation in terms of language, presenting skills and content. This innovation in assessment encourages multi-disciplinary thinking in students and the impact of audience on presentation content and delivery is something which could be explored across different academic fields.

Keywords*— *assessment, engineering competencies, oral presentation

I. INTRODUCTION (*Heading 1*)

Engineering curricula are continuously being updated to follow new developments in engineering. These include evolution of knowledge in the field and also follow research and business trends, such as increased interest in sustainable energy and embedded computing. New facets of engineering training have also emerged in the past decade, such as the incorporation of ethics, management and entrepreneurship. This evolution of the field puts increasing demands on the competencies graduates require, where technical knowledge alone is no longer sufficient.

An engineer in the modern globalised workplace, in addition to technical competence, must also be able to communicate ideas, manage projects, work in an international setting and have some understanding of business. Indeed, the ability to communicate effectively could arguably be a more important attribute for career success than technical competence itself [1]. Nevertheless, the perceived inadequacy of engineering graduates' communication competencies is a well-documented lament [2], [1], [3].

Accordingly, this changing work environment should have an impact on engineering degree programmes so they might best equip graduates for the challenges ahead. This concern is being addressed in the School of Electrical and Electronic Engineering in the Faculty of Science and Engineering in the University of Nottingham Ningbo China (UNNC) where the use of oral presentation assessment and, particularly, the use of a mixed audience of experts and non-experts, is being piloted. Through the use of presentations, students are both developing their technical skills and, crucially, how to effectively explain their work to people outside their field and develop a wider awareness of how their studies are applicable to real world issues.

II. A QUESTION OF ENGINEERING COMPETENCIES

Studies have long tried to determine the key competencies required by engineering graduates to help inform curricula design and development. A consistent theme is that while engineering degree programmes provide students with adequate technical knowledge and skills they can be lacking in terms of providing softer skills [4], [5], [6]. Interpersonal and collaborative skills are very desirable graduate attributes, along with strong communication skills [5]. This recognition of the need for the development of better communication skills echoes earlier work highlighting the importance of oral communication skills for an engineer to succeed in the modern, globalised workplace [7]. Increasing globalisation is not confined to engineers only dealing with engineers from other cultures; it also involves effective communication across disciplines, such as engineering and management. Consequently, communication skills are the key desirable competency, certainly for a graduate with management aspirations [8].

One of the reasons communication skills are valued so highly is the considerable amount of time engineers spend communicating [9] and the benefits better communication skills may bring, such as improving performance in content areas [2]. There is also consensus that engineers need to communicate to a wide variety of stakeholders [11], [12], [13] and, consequently, need to be able to explain technical information to laypeople, which can require sophisticated communicative competence. Perhaps more importantly, there seems to be a correlation between communicative competence and career advancement, [1], [10], [11].

However, developing such skills may not be achieved by providing extra communication courses for engineering students as there is also general agreement that communication

development has to happen within engineering courses themselves [2], [14]. This is particularly relevant since engineers reflecting on their degree programmes feel that oral communication skills were lacking [7]. It is common practice that engineering faculties may be concentrating on subject content at the expense of facilitating the development of soft skills. Lecturers need to become more energized to introduce innovative curriculum schemes, more proactive in developing challenging learning approaches, and more willing to integrate cross-cultural, language, and communication skills training into traditional engineering contexts [15].

The need for effective communication skills is not unique to engineering. In the field of accounting (with accountants another group considered poor communicators) oral presentations have been used to try to improve oral communication skills [16] and their use has also been discussed in relation to engineering programmes. Oral presentations may not be not considered especially important in terms of an engineer getting a graduate job, but such skills became more important when it came to getting a promotion [9]. Indeed, "A poor presenter is career limited" [8, p.688]. In fact, where technical skills are a given, it is effective communication skills and good presentation skills which can be a point of differentiation between candidates. It is important to note, however, that presentation skills are not usually discussed in the generic terms. Communicative training has to be located in authentic contexts. There has to be a focus on specific disciplinary communicative acts, suggesting different types of presentation may be required in different fields [17] which suggests that effective communication differs between disciplines and what would make a good physics presentation does not equate to a good engineering presentation [18].

A wider change taking place in higher level education is also having an impact on the student profile and this in turn has implications for curriculum design. As David Graddol noted in his landmark 'English Next' report, a situation is developing where more international students will study for a UK university degree overseas than in the UK [19]. Indeed, a report in the Guardian estimated that 18% of students currently working towards obtaining a British UK degree are doing so fully overseas [20]. English-medium higher education is expanding rapidly in Europe [21] and offshore campuses have been set up in countries as varied as Vietnam (RMIT) and Dubai (Heriot Watt). One of the most exciting markets for the expansion of English medium education is China, where government policy will lead to a significant rise in the number joint-venture programmes between Chinese and English-medium universities [22]. Currently three universities, Liverpool UK, Nottingham UK and New York USA have established campuses in China. This rise in the amount of non-native English speaker students will compound the communication competency issue within Engineering programmes previously highlighted.

III. BACKGROUND

A. *The Research Context*

The project described in this paper took place in University of Nottingham Ningbo China, a branch campus of the University of Nottingham UK. Established in 2004, UNNC awards students full UK degrees and the courses are taught exclusively through English. The majority of students are domestic Chinese, although there is a small international student cohort, consisting of both native English speaker students and non-native English speaker students. The first year of study in UNNC is a full year foundation programme focussed on English language and academic skill development, delivered by the Centre for English Language Education (CELE). Once students enter the second year of their study in UNNC formal language support ends, although support is available through CELE's Academic Support Unit (ASC) in the form of lectures, workshops and individual meetings with academic advisors.

The Science and Engineering Division (S&E) has the second largest cohort in the University after the Nottingham University Business School (NUBS). Until the academic year 2010/11, S&E only offered students 2+2 courses, that is two years of study in the UNNC campus and the final two years on the UoN UK campus. As of 2010/11 students could choose to fully complete their degrees in UNNC on a 4+0 programme. Faculty members within the School of Electrical and Electronic Engineering have a concern that the lack of immersion in an English language culture could have an adverse effect on the communication skills of students who chose to study 4+0 and consequently considered ways the communicative aspect of the course could be increased without compromising on the quality of the core technical component.

B. *A Novel Assessment in Electronic & Electrical Engineering*

It was determined that due to a manageable cohort size (individual classes not exceeding 40 students) students could deliver an end of project group oral presentation. A novel extension of this was the consideration of how the presentation task could be fully exploited. Through co-operation with colleagues from NUBS and CELE a framework for the presentation task was developed which would move the presentation from being a straight technical presentation of a circuit board and its performance to a more nuanced presentation which would also consider the business application of the circuit. This meant that both the assignment rubric and marking criteria were changed to reflect the business communication aspect of the task.

In the assignment rubric the business aspect of the task was highlighted with students not only having to build and test a circuit board but also being directed to consider its use and value since the purpose of the presentation was to obtain funding from potential investors. Within the marking scheme students were awarded marks on the following basis;

- Presentation Skills 20%
- Language Skills 15%
- Business Contextualization 20%
- Content and Mastery of Subject 45%

The decision to award marks to the non-technical aspect of the presentation was to ensure students would take all aspects of the task seriously, following a recommendation which encourages awarding marks to the communicative aspect of presentations [9]. Adding to the authenticity of the task the assessment panel would also consist of three EEE faculty members, a NUBS lecturer and a CELE tutor. This meant that students would have to carefully consider the pitch of their presentation to ensure the technical trainers were satisfied with their technical knowledge but that they were also able to communicate this clearly to non-experts. This aspect of the task was considered particularly relevant since the importance of audience and the difficulty engineers can have communicating technical knowledge to non-experts is well documented [12], [23], [24].

The presentation task was introduced and trialled in module H62ECP in semester 1. The Electronic Construction Project is year 3 compulsory module for BEng Electrical and Electronic Engineering (Hons). This is the first semester-long project students encounter during their academic programme and requires students to put into practice the concepts they have learned during their year 2 and first semester year 3 modules. Students are required to research information independently and critically evaluate that information to determine its relevance for the project to solve technical problems. As such, oral presentations became a viable medium for students to report their findings.

The assessed presentations were video recorded and the students given some feedback from three different perspectives: business, English and EEE specialist. This should help them realize how non-specialists and specialists perceived their mastery of subject and would also provide suggestions on areas to improve in their presentation and language skills. The students also receive a copy of the recording of their presentation so that they could self-assess their performance in the light of the feedback received and reflect on their strengths and weaknesses. The learning from this experience fed into the input of the next module, H62EDQ and in parallel H62BPA, to give them the tools to begin actively experimenting, using their improved understanding and new strategies to produce a better performance.

H62BPA - The Electrical Design Project is year 3 compulsory module for BEng Electrical and Electronic Engineering (Hons). In this module students will first study the techniques for the production of material for presentation to groups (covering large, small and seminar styles); following this instruction on good practice in a presentation will be given. Students will then gain experience in presenting both as individuals and as part of small groups - the topics for these presentations will relate to the degree being read with students expected to produce talks aimed at their peer group. Following this a study in the various methods of visual presentation of information will be given; this will cover both electronic formats (web, powerpoint etc) and printed media (poster, flyer etc). In summary presentation skills will be developed through oral presentations, report writing, poster design and web design. These skills could then be applied to H62EDQ - The Electrical Design Project, another year 3 compulsory module for Beng Electrical and Electronic Engineering (Hons). This is the second semester-long project students encounter during their academic programme and requires students to put into practice the concepts they have learned during their year 2 and first semester year 3 modules. Students are required to research information independently and critically evaluate that information to determine its relevance for the project to solve technical problems.

To help embed oral presentations fully into the curriculum they were also used in the assessment of the Year 2 module, H61RTS. Introduction to real-time systems is compulsory year 2 module for BEng Electrical and Electronic Engineering (Hons). This module requires the students to apply the material covered in the first semester and apply it along with new knowledge learned in this module. This module is lab/project based on clear walkthroughs and guidance to gain experience through the designed labs and then to better develop the projects of the module. Since this was a larger cohort it also helped assess the scalability of the use of oral presentation assessments.

The idea behind streamlining this activity through different modules is to get them to go through this cycle several times to improve gradually their performances over three years to produce high impact and quality presentations for the final year project VIVA and, most importantly, get them ready to communicate technical content professionally in the industry to various audiences. This process of presenting and reviewing follows the Kolb Learning Cycle (see Fig 1).

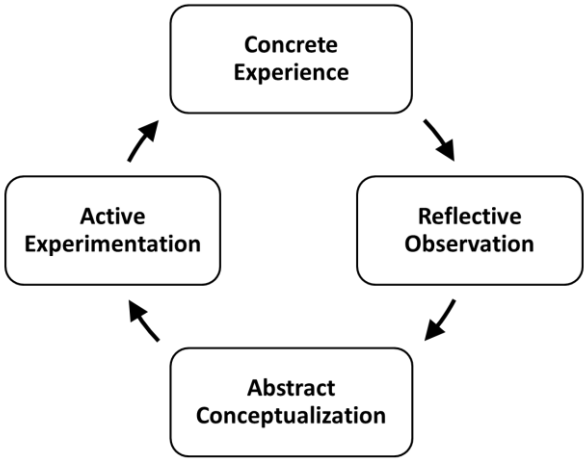

Fig. 1. The Kolb Learning Cycle [25]

C. Putting Presentations In To Practice

For the assessed presentation in H62ECP students had to

design and implement a circuit and were asked to think of a possible application/product for the circuit. They were told that there would be a business person in the audience and to expect questions related to the product. As well as encouraging them to consider the business application aspect of engineering it also forced them to take a holistic view of their project as opposed to overly focusing on the component level, which had been a perceived problem. Presentations were due to be 10-15 minutes long, with 5-8 minutes of questions.

Based on the experience of this cohort the presentation requirements were changed in the second semester with 10 minutes given for students to present and 8 minutes for questions. Based on the first round, it was noted that with 15 minute presentations there was a tendency for students to lose themselves in technical details rather than fully developing the bigger picture. It also became clear that the Q&A session was often cut short, with not all panel members having an opportunity to ask questions and it was felt that the Q&A should be exploited as an opportunity to both assess student's ability to communicate spontaneously and also explore certain parts of their project in more detail.

To help support students during the second semester in H62BPA students studied the techniques for the production of material for presentation to groups (covering large, small and seminar styles) and also receive formal instruction on good presentation practice, with a particular focus on the distinction between technical and non-technical presentations. Students also had the opportunity to do non-assessed presentations in class, with the topics for these presentations relating to the degree they were undertaking, with students expected to produce talks aimed at their peer group. Students also received instruction in the various methods of visual presentation of information, covering both electronic formats (web, powerpoint etc) and printed media (poster, flyer etc). In addition, students also received a lecture from a NUBS professor, outlining the expectations they would have for a successful presentation.

IV. Assessment Procedures & Results

The presentations were assessed on four main criteria, each of which contained several specific features, as shown below.

Presentations Skills (20%)
- Introduction and Topic & Sub-themes
- Structure and Linking Points
- Eye Contact and Body Language
- Visual Aids and Reference to Visual Aids
- Holding Audience Attention (e.g. Impact Strategies)

a)

Content & Mastery of Subject (50%)
- Content (Research and Delivery)
- Mastery of subject
- Referencing and Citations
- Questions and Closing

Language Skills (15%)
- Language Use (Grammar & Vocabulary)
- Fluency, Pace, and Volume
- Pronunciation (Clarity, Stress and Intonation)

Business Contextualization (15%)
- Innovativeness
- Ease of Commercialization
- Technical Feasibility
- Economic Feasibility

The assessors were sent the criteria for assessment in advance and had an opportunity to ask for clarification before the presentations began. There was no formal standardization for this pilot scheme as there were no presentations which could be used for standardization purposes.

The technical assessors tended to mark students more highly for each criterion. This could be due to a closer understanding of the expectations of the presentations or greater familiarity with the students and the complexity of the task. However, there was also a greater difference between the highest and lowest average mark given by individual EEE assessors than the difference between the average marks given by the EEE assessors and those given by the non-experts.

V. Reflections

To gain some feedback on the assessment change and to help inform future developments feedback was obtained from both lecturers and students. Lecturers were interviewed and students completed a questionnaire, with a high rate of return for both groups.

A. Tutor Feedback

Once the assessments were complete the lecturers who took part in the presentations were interviewed. For the sake of convenience at a busy time of year the three EEE lecturers were interviewed together and the non-specialist lecturers were interviewed individually or in pairs.

1) EEE Lecturer Feedback

Since the EEE lecturers were involved in the development of EEE oral presentation assessment from the outset the interview took in five main areas and the findings are summarised below. The three lecturers who participated in the group interview included one native English speaker and two non-native English speakers and of two of whom were men and one woman.

Why use oral presentations?

It was interesting to see how much the motivation for using oral presentations came out of the lecturers' own experience and awareness of the challenges they had faced communicating effectively and learning how to deliver effective presentations. The main motivations for initiating the oral presentation task were;

- developing students' language & communication skills.
- working as engineers the students will often have to explain their work to a mixed audience or an audience unfamiliar with their specific field.
- developing communication skills takes time and engineering students have limited opportunities to develop oral communication skills.

b) What makes an effective presentation?

There was also a lot of agreement as to what they had been hoping for in student presentations.

- technical content should be accessible – a non-specialist should be able to follow the main ideas of the presentation.
- the presenter should speak spontaneously – this was a particular concern in UNNC as the majority of the student body is Chinese and there is a particular tendency to rote learn a script as preparation for an oral presentation.
- a focus on results and outcomes rather than methodology.

c) Positive Aspects of Student Presentations

The lecturers felt that students had done quite well with the task, particularly given that it was a new type of presenting for them. Areas of particular strength were;

- aspects of technical presentation skill such as slide design and effective use of body language.
- students were also able to describe theory effectively, although there was an issue related to theory which will be explored further in the next topic.
- two of the lecturers also felt that pronunciation was effective, although there was also a feeling that perhaps students were not always speaking naturally.
- the feature of presenting that had an impact on pronunciation was delivering a learnt script, which students were able to do well, albeit that this is not an approach the lecturers would encourage.

d) Areas of Performance Students Could Improve

Although the lecturers were generally pleased with the student presentations there were certain areas which would need more attention to improve future presentations:

- speaking freely – there was an observed overreliance on scripting and notes.
- adjusting a presentation mid-delivery e.g. expanding areas the audience finds interesting or skipping irrelevant material
- although students were able to describe theory well there was a failure to show the connection between theory and student experimentation/results. It was felt that showing this connection should be the minimum students were doing and higher performing candidates would be able to explain any disparity between theory and actual performance.
- being more creative when considering application of products or systems

There was also a concern that perhaps students would not pay adequate attention to the feedback on their presentations, which could be overcome by their writing a short assessed reflection after watching their presentation video and reviewing the tutor feedback.

e) Future Implications

Based on the experience of the trial programme there were also several considerations that were discussed in the interviews.

- It was felt there needed to be more liaisons between CELE and NUBS. It was hoped that CELE would be able to provide a clearer profile of the presentation skills students should be entering EEE with and would also be able to cooperate in the development of workshops designed to help students with features of presentations that needed improvement. Work with NUBS would be to get more business input and perhaps a more formal system of giving each EEE presentation group a business student advisor who could give support on the business aspect of the presentation.
- Thinking longer term, the issue of scalability was also discussed with suggestions for dealing with a larger cohort being:
  - to potentially increase group size or decrease presentation time (both of which could compromise the value of students doing presentations)
  - to run parallel presentations with different assessors using the same marking criteria.

There was also a discussion regarding student motivation and the need to emphasize to students the value of presentations and communication skills for future career development. An interesting suggestion for doing this was potentially liaising with industry so students in the final year could present to real companies, thus making the task less academic and more authentic.

2) Non-Expert feedback

The interviews with the non-technical assessors looked at how the students had dealt with the task and how the assessors had felt marking technical presentations.

a) Student Performance

The non-technical assessors were in broad agreement with

the technical assessors as to the positive features of students presenting. An aspect which had a particular effect on the perceived knowledge of the student was the enthusiasm and confidence with which they presented. It was felt that if a student presented confidently then that reflected on how well they knew their design and its application. It was also felt that the business side of the presentations needed improvement in terms of students being realistic about the amount of funding they would need and what they would be able to do with it.

b) Assessing Technical Presentations

The assessors felt the students who were most effective were the ones who scaffolded their presentations for the audience, giving them the bigger picture first before focussing on the particular circuit board they were discussing. Less successful students had a tendency to go straight in to discussion of how the board worked without giving an indication what it might be used for or why the audience might be interested. The non-technical assessors also found the Q&A section particularly useful for grading the technical aspect of the presentation as when students were speaking spontaneously or were challenged on a point by a technical expert lecturer it was easier to see how well they really knew their material. There was also a suggestion that the marking criteria could be streamlined and so become easier to use.

B. Student Feedback

Students were asked to complete a questionnaire after they had completed all of their assessments for the semester. The questionnaire covered general aspects of presenting and also questions which asked students to reflect on how they felt their presentation had gone.

1) General Presentation Feedback.

More than 50% of respondents said they enjoy giving presentations and 80% of students found giving presentations useful. The students were also confident they know how to structure a presentation and about being able to explain technical information to non-technical people, although the response of the lay assessors suggests this confidence may not be fully grounded. Many students reported needing to write a full script to know what they were going to say in the presentation. This showed in the presentation where the language skills were good but the delivery felt like it had been memorized and some students even depended on cards to remember their speech. This might be partly due to a lot of students feeling they needed more time to prepare their presentation. An interesting area which brought mixed reactions from students was the question regarding the importance of content versus presentation skills.

The majority of students expressed difficulty in planning the presentation for a mixed audience, which is in some ways encouraging as it means they were attempting to consider the needs and knowledge of the audience in advance. It also meant they needed to adapt to the audience and think about how to explain complex concepts in accessible terms and also think about business aspects and applications that they are not very familiar with. This was also reflected in students' relatively weak agreement in relation to being comfortable with the business side of the task.

2) Delivering an EEE Presentation

The students report that the delivery went as planned although over 50% of them report relying too much on their prepared script rather speaking freely. This showed in the performance and this could also be attributed to a lack of preparation or lack of time for preparation. They were also confident that the audience got some useful information from their presentations, and this is reflected in the reaction of the assessors who generally enjoyed the presentations and found them informative. There was a mismatch between students' feeling they had successfully linked theory and simulations and the assessors' identification as one of the weakest aspects of the student presentations.

As for the Q&A sessions, the students were very surprised by the questions that were asked. Experts and non-experts focus on different things so this session is quite challenging for the students. One way of limiting this impression would be for the convenor to limit the scope of questions that can be asked during the Q&A but then it also limits the impact of dealing with unexpected questions and impromptu speech. Impromptu training is very important to learn how do adapt dynamically to unexpected events or situations arising during a presentation. Students reported that they were prepared to answer business questions. Assessors concur on this, given their limited exposure to the subject prior to the presentation they performed well in general. Over 50% of the class responded that they felt that answering technical questions was easier than business questions, which is lower than expected given that they are engineering students.

3) Open Ended Questions

The questionnaire also provided the opportunity for students to give any other comments about presenting.

a) If you had to do a similar presentation again, what would you do differently?

Students felt there was a need for them to focus more on technical content and they also identified that further research on the subject would have benefited the delivery. Several students mentioned difficulty in balancing the technical and the business aspects of the presentation and some identified a need to better either business or technical aspects or both.

A few students realized that their delivery could have been better had they put sufficient time into preparation; speed of delivery would be controlled, the delivery would be natural as opposed to be memorized, stress would be reduced and confidence would be increased. Also, they realized that talking

to non-experts is more difficult than they thought it would be. They wrote that they would need to reduce technical details to avoid boring the audience and practice on vulgarizing complex ideas for the layman.

Encouragingly, it was recognized that following this experience, it would be easier to prepare for their next presentation.

b) How does the audience affect your presentation planning, preparation & delivery?

Students expressed difficulty in finding the balance for experts and non-technical experts – recognising the need to be accessible to the layman but sufficiently technical to satisfy the experts. Some students mentioned anxiety over presenting technical content to experts because they don't want to get it wrong and there also seems to be a concern over the non-experts in terms of trying to determine what they can and cannot understand of the presentation. Some students even infered that without non-experts, it would be easier to deliver a purely technical presentation thus discarding adapting to an audience and remaining focused on the technical details, where they feel more at ease.

An unexpected response that came up from several students was the impact the audience had on them. They describe that the facial expressions of their audience had a significant effect on their delivery and sometimes makes them lose confidence or make them more confident about what they are saying. A common request was for the audience to smile as if they look serious it makes the student feel stressed. This also demonstrates that audience adaptation should be further developed in those students because they do not know how to react to confusion, seriousness or smiles or what would be appropriate behaviour for an assessor in exam conditions.

c) Where do you feel you need more help in preparing or practicing presentations?

Students reported various areas that need improvement based on their first experience. Some were related to presentation skills, with students wanting more preparation to deal with body language, stage fright, developing confidence and having good presentation time management. Other areas of concern included:

- Developing business content e.g. how to develop ideas for products
- Making the presentation interesting
- Language skills
- Message construction and designing concise visual aids
- Audience adaptation
- Learning the balance between too technical and not technical enough.

VI. Discussion & Recommendations

Introducing oral presentation assessment has been viewed positively by both faculty and students. The introduction of the non-technical side of the presentation task has been challenging for students but added an extra dimension to the task which helps address both communicative and business related competencies. Similarly, the use of a mixed panel of technical experts and non-experts made the presentation task reflective of the real world interactions engineering students may face upon graduation.

In order to help support students in the development of the skills and strategies required to succeed in such a presentation task there is a need for more non-technical input into the course in addition to the single business related lecture. That is not to say that the business side of the course should take away from the technical content but rather that when there are opportunities to extend a technical topic into wider real world application it should be taken. Rather than having business taught as a discrete topic, which students may or may not value, it is recommended that there is a continual slant towards encouraging students to take a helicopter view rather than becoming overly focused on technical details.

It would also be beneficial if the informal relationships some presentation groups developed with business student peers could become more formalised. While some incentive for participation may be required to get business student involvement it would be highly beneficial if each engineering presentation group could have a business student consultant both in the presentation development stage and in the final practise stage, so students could get an idea of the kind of response their presentation would get from a lay person.

Now that there is a large library of student presentations on file it is also possible to standardise presentation assessors prior to the examination period. If lecturers are able to view sample presentations prior to the live exams it will help standardise expectations and provide a firm benchmark for the standard of performance expected.

VII. Conclusion

In light of the changing demands of the workplace engineering graduates require more than pure technical knowledge. It is vital they are able to express and explain that knowledge to both specialists in their field and lay colleagues. A means of helping students achieve this is through the use of oral presentation tasks and the use of mixed panel assessment can mimic the real world environment. By embedding presentations through each academic semester appropriate presentation skills and oral fluency and competence can be developed. The use of mixed panel assessment of oral presentations has been successfully piloted in UNNC and can become fully embedded in the EEE curriculum, with a view to the assessment task being adopted in other schools within the Science and Engineering Division and, potentially, beyond. Such a presentation task speaks directly to the competencies most often found to be wanting in engineering graduates.

REFERENCES

[1] A.L. Darling, & D.P. Dannels, "Practicing engineers talk about the importance of talk: A report on the role of oral communication in the workplace." *Communication Education*, Vol 52 (1), pp. 1-16, 2003.

[2] M.R. Baren, & J. Watson, "Developing communication skills in engineering classes." In *Professional Communication Conference*, 1993. IPCC 93 Proceedings. 'The New Face of Technical Communication: People, Processes, Products' (pp. 432-437). IEEE. October, 1993.

[3] R. Stephens, "Aligning Engineering Education and Experience to Meet the Needs of Industry and Society." *The Bridge*, Vol. 43 (2). 2013.

[4] S.A. Male, M.B. Bush, & E.S. Chapman, "Perceptions of competency deficiencies in engineering graduates." *Australasian Journal of Engineering Education*, Vol. 16 (1), pp.55-67. 2010.

[5] K.T. Rainey, R.K. Turner, & D. Dayton, "Do curricula in technical communication jibe with managerial expectations? A report about core competencies." In *Professional Communication Conference*, 2005. IPCC 2005. Proceedings. International (pp. 359-368). IEEE. July, 2005.

[6] J.D. Gilleard & J. Gilleard, "Creating a leading edge: The link between second language proficiency, academic performance and employment leverage for engineering students." *International Journal of Engineering Education*, Vol. 16 (6), pp. 476-482. 2000.

[7] M.J. Riemer, "English and communication skills for the global engineer." *Global Journal of Engineering Education*, Vol. 6 (1), pp. 91-100. 2002.

[8] P. Sageev, & C.J. Romanowski, "A message from recent engineering graduates in the workplace: Results of a survey on technical communication skills." *Journal of Engineering Education*, Vol. 90 (4), pp. 685-693. 2001.

[9] D. Vest, M. Long, & T. Anderson, "Electrical engineers' perceptions of communication training and their recommendations for curricular change: Results of a national survey." *Professional Communication*, IEEE Transactions on, Vol. 39 (1), pp.38-42. 1996.

[10] J.A. Polack-Wahl, "It is time to stand up and communicate [computer science courses]." In *Frontiers in Education Conference*, 2000. FIE 2000. 30th Annual (Vol. 1, pp. F1G-16). IEEE. 2000.

[11] G. Palmer, & D. Slavin, "Graduate engineering professional development." In *Professional Communication Conference*, 2003. IPCC 2003. Proceedings. IEEE International (pp. 6-pp). IEEE. September, 2003.

[12] N. Dukhan, "Communication in undergraduate research." In *Information Technology Based Higher Education and Training*, 2005. ITHET 2005. 6th International Conference on (pp. S2A-17). IEEE. July, 2005.

[13] M. Kato, & C.T.D. Lo, "Discovering a strategy for professional communication with new frontiers through classroom presentation." In *Professional Communication Conference*, 2004. IPCC 2004. Proceedings. International (pp. 223-234). IEEE. 2004.

[14] A. Jennings, & J.D. Ferguson, "Focusing on communication skills in engineering education." *Studies in Higher Education*, Vol 20 (3), pp. 305-314. 1995.

[15] J. Gilleard, & J.D. Gilleard, "Developing cross-cultural communication skills." *Journal of Professional Issues in Engineering Education and Practice*,Vol. 128 (4), pp. 187-200. 2002.

[16] D. Kerby, & J. Romine, "Develop oral presentation skills through accounting curriculum design and course-embedded assessment." *Journal of Education for Business*, Vol. 85 (3), pp. 172-179. 2009.

[17] A.L. Darling, "Public presentations in mechanical engineering and the discourse of technology." *Communication Education*, Vol. 54 (1), pp. 20-33. 2005.

[18] N. Artemeva, S. Logie, & J. St‐Martin, « From page to stage: How theories of genre and situated learning help introduce engineering students to discipline‐specific communication." *Technical Communication Quarterly*, Vol. 8 (3), pp. 301-316. 1999.

[19] D. Graddol, "English Next." British Council, London. 2006.

[20] F. Whitehead, 'British Universities Overseas: it's about more than just a piece of paper', on Guardian website <http://www.guardian.co.uk/higher-education-network/2011/aug/01/british-universities-overseas-piece-paper> (accessed 03/09/11)

[21] J. Coleman, "English-medium teaching in European Higher Education." *Language Teaching*. Vol. 39 (1) , pp. 1-14. 2006.

[22] W. Chao, "Mixed Results" on China Daily website <http://www.chinadaily.com.cn/usa/2011-07/22/content_12960768.htm> (accessed on 03/09/11). 2011.

[23] J.L. Cox, "Technical topic, lay audience: How to make a good presentation." *Professional Communication*, IEEE Transactions on, (1), 26-28. 1980.

[24] T.L. Eng, "Teaching oral communication at MIT: The concept module." In *Education Technology and Computer* (ICETC), 2010 2nd International Conference on (Vol. 2, pp. V2-541). IEEE. June, 2010.

[25] H. Fry, S. Ketteridge, & S. Marshall, (Eds.). "*A handbook for teaching and learning in higher education: enhancing academic practice*." Routledge. 2008.