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# Roadshow Presentations for Developing Presentation and Feedback Skills in Studio Based Learning

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**Abstract**—Studio Based Learning (SBL) is related to the well established Problem Based Learning (PBL) approach. At the University of Technology Sydney we apply SBL in the delivery of undergraduate engineering subjects. This paper updates the description of the Studio with a focus on the steps that have been taken to adapt it to online delivery in the context of the pandemic and describes the adoption of roadshow presentations in the engineering studio subjects as a method to develop students' presentation and feedback skills. We report on the method used and feedback received from students.

## I. INTRODUCTION

Over the last couple of decades, the professional engineering community has seen major changes in work practices, approaches to solving problems and the nature of the problems they are being asked to solve. There has also been a recognition that professional engineers, although having a high level of technical competence, lack well developed communication and team-work skills and an ability to integrate into cross disciplinary teams. In response to these challenges the Engineering Education sector in Australia has been actively engaged in reviewing how we train the engineers needed for this new environment [8]. One of the major outcomes of this review has been the recognition of a need for a greater focus on exposing students, at an earlier stage in their undergraduate degree, to an experience of “real world” professional engineering practice and to develop a capacity for self-learning and self-efficacy.

The advent of pervasive information technology in higher education has enabled the introduction of new ways of engaging learners. It has enabled us to think very differently about the way that we educate engineers. In particular, it has enabled us to “flip” the classroom so that students can take on the responsibility of acquiring knowledge, while academics can take on the responsibility of helping students convert that knowledge to capability – essentially a change from a “teaching” paradigm to a “learning” paradigm [2]. The Studio as implemented in our engineering program is just such an experience [5].

The School of Electrical and Data Engineering at the University of Technology Sydney runs three, four-year (8 semesters) Bachelor of Engineering (Honours) programs: Data Engineering, Electronic Engineering, and Electrical Engineering. Each of these has a sequence of 6 studios, one per semester, running through semesters 2 to 7, bookended by an Introduction subject

in semester 1 and a capstone project in semester 8. Each studio represents 25% of the semester's study load for a full-time student.

Braun [6] described their first experience of providing a Studio experience to first year engineering students and later described the extended implementation of Studios across a four year engineering degree [7].

Studios are truly “flipped” subjects [5, 21, 27, 28]. As long ago as 1938, the American pragmatist John Dewey [11] said that sharing experiences, and building knowledge based on own and previous experiences was crucial. Dewey advocated experiencing as a tool for learning. Another example is Little [17] who described “studio” methods in an introductory design curriculum. Prince and Felder highlight the value of inductive learning in engineering [20] reviewing a long history of project- and problem-based learning in engineering.

To investigate the attitudes of students to Studio Based Learning (SBL), Trede [25] conducted a study within UTS undergraduate Studios using a critical hermeneutics interpretation to assess students' freeform visual expressions of their experience of SBL. They identified three major themes in the results of the study: teamwork, leadership and reflection. The participants in the study were overwhelmingly positive about the shift away from didactic lecturing and while they found the studio approach challenging and sometimes frustrating, they welcomed the collaborative learning opportunities and the product focus of the approach.

In this paper, we describe the incorporation of roadshow presentations for the mid-semester standups previously described [4]. This interactive mode of presentation has been used in other engineering and IT subjects since 2012 and is inspired by the environment of trade fair presentations and shares elements with other alternative presentation methods such as Pecha Kucha (also known as Lightning Talks) [10], Speed Geeking [15, 24], Gallery Walk [13] and the World Café method [30], all flexible formats for hosting dialogues in large groups.

## II. CONTEXT FOR THE STUDIOS IN THE DATA AND ELECTRICAL ENGINEERING PROGRAMS

Studio Based Learning arises from the well developed pedagogies of Problem Based and Project Based Learning. To place SBL in context we provide a brief review of those related approaches.

## A. Existing Learning Pedagogies in STEM

1) *Content Based Learning (CBL)*: Sometimes known as "Chalk and Talk" or "Sage on a Stage", this is the traditional, didactic classroom approach. The lecturer first presents the content. Then the lecturer presents problems for students to solve, and finally presents solutions. This one-way mode of knowledge dissemination is widely argued to have limited effectiveness in achieving learning outcomes [9, 14, 26].

2) *Project/Problem Based Learning (PBL)*: The terms Problem Based Learning and Project Based Learning refer to a range of related learning styles for which there are many different variations. Recently, the trend in engineering education has been to conflate these related approaches and refer to them by the single initialism PBL. The exemplar often cited for this approach is that of Aalborg University which combines the elements of both approaches into what they call Problem Based Project Organised Learning [1]. However, it is important to recognise the variation in the way that these approaches are implemented [16]. Though it is somewhat artificial because of the wide variation in the implementation of PBL, we will characterise the more extreme variations as Problem Based Learning and Project Based Learning.

In their definition of Project Based Learning, Prince and Felder [20] state that it "begins with an assignment to carry out one or more tasks that lead to the production of a final product – a design, a model, a device or a computer simulation. The culmination of the project is normally a written and/or oral report summarising the procedure used to produce the product and presenting the outcome."

The establishment of the Faculty of Medicine at McMaster University in 1966 and the McMaster Philosophy [18] which was the foundation of their approach to undergraduate teaching laid the groundwork for what was to become Problem Based Learning [3]. The approach was motivated by the observation that students taught with traditional CBL methods tended not to retain basic theoretical knowledge long enough to successfully apply it in practical subjects in the later years of their degrees. Barrows and his fellow academics felt that inverting the learning process by presenting students early in their degrees with practical problems to solve, and allowing them to identify the theoretical material they needed to solve the problem, would result in greater engagement and better learning outcomes.

In defining Problem Based Learning, Prince and Felder [20] state that it "begins when students are confronted with an open-ended, ill-structured, authentic (real-world) problem and work in teams to identify learning needs and develop a viable solution, with instructors acting as facilitators rather than primary sources of information."

The critical differences from this perspective are:

- Project Based Learning
  - has well-defined goals;

- delivers an outcome that is an identified product;
- requires students to identify necessary learning content.
- The product itself is a core focus of the assessment.
- Problem Based Learning
  - has a well-defined problem;
  - requires students to define the solution;
  - requires students to identify necessary learning content.
  - The assessment is focused on the competencies gained and the processes followed.

## B. Studio Based Learning

Studio Based Learning shares much of the underlying philosophy that motivates Problem Based and Project Based Learning. However it seeks to provide problems and an environment that closely resembles that of an engineering team in the real world with much of the complexity of problems and context that this entails.

The primary goal is to develop the students' ability to solve real engineering problems. To do this they rely on using knowledge and skills they have acquired from their other studies and supplement that with new knowledge and skills that they identify and acquire specifically for the Studio. The emphasis here is on the students defining their own learning needs and identifying the resources to meet those needs. This approach allows students within one cohort to acquire a diverse set of skills and knowledge optimised for their own interests and needs.

Studio Based Learning begins with students forming teams to develop one of a number of loosely defined products offered to them. These products are chosen to be authentic, topical and to meet a real-world need. The students are not offered any sort of specification for the product. The product may be a mix of software, data analysis and hardware and each product will rely on skills from a range of disciplines.

The authentic real-world nature of the products and the focus on the product meeting a clear need of an identified audience means that in addition to the wide range of technical skills that the students must possess, they also require a level of competence in a range of non-technical, human-focused skills and knowledge. Communication skills, teamwork, leadership, project management and planning skills, understanding of the regulatory, intellectual property and market context for their product and of the social and ethical dimensions of the impact of their product are all important.

Studio Based Learning is focused on building students capabilities, not simply adding to their knowledge and skills. We believe this focus, and the engagement engendered by the authentic and topical nature of the products, results in better retention of the acquired skills and knowledge.

## C. Purpose of the Studios

Conventional content-based subjects focus on the delivery of a well specified curriculum, with the same content being

delivered to all of the students undertaking a subject. The students are evaluated to test the extent to which they have acquired the intended skills and knowledge. Typically, the only active selection of subject matter by the students is whether or not they take the subject. The learning delivered by Studio Based Learning is not homogeneous and the skills and knowledge that the students acquire is largely at their own discretion and motivated by the needs of the product that each team chooses to develop.

In the context of our degree programs, studios are product-based experiential learning opportunities, which follow the pedagogical motivations of Problem Based Learning but emphasise the students' active involvement in defining their own learning needs. We use the term product to emphasise the key difference between the studios and PBL. The product is the end goal. Its development throws up unforeseen challenges that the students must identify, and to which they must find solutions. The products offered to the students are defined only by a brief product description and an indicative solution, leaving the students with considerable scope to explore and define their own solutions. The product-based approach encourages exploration and evaluates the process the students pursue rather than the solution they deliver.

#### *D. Structures and roles in studios*

Our studios are designed to provide students with an experience which, as much as possible, mirrors what they might encounter working in a real world engineering environment. Activities in the Studio are therefore focused around small teams of students undertaking the development of a product, with students often studying different majors, bringing multidisciplinary perspectives, as is typical in workplaces. The students are offered a number of brief product descriptions and are then asked to form teams and define their product under the guidance of a Product Owner and with the support of an Academic Mentor.

The Product Owner has an industry focus and in some cases will be from an external body such as a company with which the University has a research relationship. The initial role of the Product Owner is to guide the student team in defining their product and creating a requirements specification so that the product is focused on solving a real world problem in a way that has the potential to have measurable impact and also so that it presents a significant challenge.

The role of the Academic Mentor is to provide support and advice to help students overcome obstacles they are expected to inevitably encounter. This is usually in the form of guiding the students to resources that would help them to solve the problems themselves but if that fails it may involve more direct advice about how to address design or implementation challenges. The Academic Mentor is also responsible for providing timely feedback on the submitted individual and team based assessment tasks.

### III. DETAILS OF THE STAGES OF THE STUDIO

#### *Stage 1 - Defining the problem (First 3 weeks)*

In this stage the students review the offered products, form teams and select a product to work on. The teams then analyse the product description, discuss it with the Product Owner, define the challenges, analyse team strengths and weaknesses, consider individual roles and design a candidate procedure for the delivery of the product. The deliverable is a written Product Proposal.

This Product Proposal presents a reframed statement of the problem the product is intended to solve from the team's perspective, along with the team's understanding of the audience for the product and the impact that they would like to achieve with their product. The document outlines, at a high level, the solution that the team will develop and the process they will apply. We ask the students to frame the product delivery in the context of a "path to impact". By this we mean: do the students see this as a potential commercial product (either to be delivered by their industry-based product owner or to form the basis of a start up), or as an open source product or an educational kit. This context is important in informing the design choices the students will make in the next phase of the product development. Although it is not required or expected that this impact be realised, it has happened and this in itself is quite motivating for the students.

The product proposal is quite brief and is inevitably largely conceptual since at this stage, the students will not have had the opportunity to develop a detailed design. Also, for many of the students, particularly in the Fundamentals cohort, their grasp of the skills and knowledge required to develop the product may be tenuous. Students often find this challenging and this is intentional. The products the students undertake are relatively complex (in fact the product development often ends up being split over two 12-week studios). The pedagogical value of requiring students to prepare a proposal this early is that they come to learn that you do not need to understand a problem in depth to begin specifying it.

#### *Stage 2 - Exploring solutions (Next 3 weeks)*

In this stage, the team typically creates several conceptual designs, evaluating the relative advantages and disadvantages of each, and making a choice as to which one they will move forward with. At the end of the stage, students deliver a "standup" presentation where they will pitch their chosen design to other students in the studio, the product owners and the academic team. In the past, this has taken the form of a brief oral pitch with a single slide, to the full student cohort and to the collected Product Owners and Academic Mentors. In our most recent delivery of the studios, we have explored a new approach to this pitching process that we have termed "Roadshow Presentations". We describe this more in section VI below.

### *Stage 3 - Detailed design and prototyping (Next 3 weeks)*

By the third stage, the team should now be finished their brainstorming and solution selection, and are now able to work on the detailed design of the chosen solution. The team will have divided up the specific design tasks, keeping good design documentation. This prepares the team for the implementation phase.

### *Stage 4 - Building the Product (Last 3 weeks)*

The final stage is when the team works on building their product from the design created in Stage 3. The team will have divided up the specific tasks needed to create the product, keeping good design documentation, and a plan for integration of component parts to deliver the overall solution.

## IV. ASSESSMENT WITHIN THE STUDIOS

Our experience in the studios has been that if a component in the studios is not explicitly graded then students often do not see it as requiring their attention. In contrast, when tasks are graded, students tend to focus on how to optimise their grade which is often detrimental to them maximising the learning opportunity offered by the task.

The assumption underlying the grading of students is that a student's competence at a task can be measured and represented by a single number. But very few assessment tasks are simple enough that they can be considered as one-dimensional. So to arrive at a grade we typically impose a somewhat arbitrary mapping of the student's multi-faceted competence to a single number, the grade. Grading also implies that if Student A is better than Student B who is better than Student C, by whatever metric is used, then Student A must necessarily be graded higher than Student C. But sometimes Student C is better than Student A in some significant aspects of the task but worse at others and it is the arbitrary mapping that is imposing a forced ranking of the students. So this presumed "transitive" property of grading is also an artefact of the arbitrary mapping imposed to create the grade.

This presents something of a quandry. We use grading as a key tool to incentivise students, but we know that it is a blunt and inaccurate instrument that can distract students from the learning opportunities offered by their assessment tasks. The compromise we currently employ is to limit summative assessment by breaking the major tasks down as much as possible and assessing progressively, providing feedback to the students with each incremental task. This more formative approach helps to guide students to better learning outcomes. At the same time some of the learning tasks are not directly assessed at all but do link to other tasks that are assessed to provide some incentive for students to engage with them.

All of the activities in the studio are focused on the product development. Some of the assessment components, although motivated by the team product development and planned in

coordination with the team are completed and assessed strictly individually.

The first individual assessment component is the Individual Learning Contract. In the agreement phase of this component, students undertake a skills gap analysis that allows them to identify and commit to SMART [23] learning goals that will help them develop the knowledge and skills required to contribute effectively to the product development. We require students to commit to two technical and two non-technical learning goals, emphasising the importance not only of technical capability, but broader professional development as a key goal of the studio program. In the delivery phase of this component the students complete the learning activities, prioritising those of most immediate need for the product development, and document their progress with regular submissions of their recent record for assessment.

The second individual assessment component is the Personal Design Journal, with which students regularly record their activities that contribute to the product development in a journal format. Referring to it as a design journal highlights that we are looking for students to especially note key design decisions that they have made along the way, and the alternatives and decision-making process that informed their choices. Students are encouraged to record details of their individual activity against product development tasks, including ideas, planning, speculation, successes and failures. They submit regular updates for assessment.

The product development itself is both group and individually assessed. This third assessment component takes the form of final report and an oral presentation. As part of the final report the students submit a record of their individual contributions to the major tasks in the product development. This helps to ensure that each team member makes an effective contribution to the product development. The claimed individual contributions are verified against each student's entries in their Personal Design Journal and the individual assessment is augmented by a Sparkplus [29] peer assessment within each team.

## V. FACILITATING COMMUNICATION

Central to the studio approach is the student teams. To maximise team productivity, there needs to be effective communication both within the team and between the team and the faculty members responsible for the studio. After stage 1, once the teams have formed and have begun defining their product, regular team meetings are the core mechanism to facilitate communication within the team and with their Product Owner and Academic Mentor. These weekly meetings are augmented through the use of online collaborative software to support regular dialogue.

In a face-to-face delivery mode, this is typically achieved through a regular weekly class session during which teams work on product related activities and meet with their Product Owner and Academic Mentor. This takes the form of a single

classroom in which each team is sitting at their own table. The geographic colocation afforded by the face-to-face delivery mode means that Product Owners and Academic Mentors can easily circulate among the teams, spending as much time as they needed with each team for which they had responsibility over a three hour period each week. These meetings generally took a form similar to standup meetings in the Agile project management methodology, with teams giving weekly standups to their Product Owner and/or Academic Mentor when they join the table.

As a result of the COVID-19 pandemic, the studios were forced to move to online delivery in 2020 and again in 2021. One of the challenges faced when offering the studios in a remote learning format is achieving effective regular communication between the student teams and their Product Owners and Academic Mentors. We therefore schedule these meetings on a fixed timetable. The remote learning mode has also offered less flexibility of having different experts in the room simultaneously circulating among different teams, as it is much harder to coordinate the matching of experts (Product Owners and Academic Mentors) to teams that need their assistance when each team is working in their own separate virtual “room”, rather than having groups collaborate in a larger shared workspace.

The move to remote online learning has however provided the opportunity to rethink how teams pitch their product proposal to their peers as well as the Product Owners and Academic Mentors. In the face-to-face delivery mode in previous semesters, this took the form of each team giving a brief oral pitch with a single slide. One option would be to translate this format directly to the online space, with each team giving a brief online pitch to a large audience comprising all other students, plus Product Owners and Academic Mentors. However we felt this might not be as engaging as in a face-to-face environment, as (1) there is little motivation for students to sit and watch others’ presentations; (2) we have observed that students joining online classes often prefer to keep their cameras off, and it can be daunting presenting a large audience when you cannot see their face or body language; and (3) we also recognise that long online sessions can be fatiguing for everyone. Further, in this style of pitch, each team only gets one chance to convey their message.

It was our desire to seek a better solution for product proposal pitches that led us to trialling the format of Roadshow Presentations as described in the next section.

## VI. THE ROADSHOW PRESENTATION FORMAT

There is a strong focus in the studios on developing students’ communication skills. As part of the Individual Learning Contract, many students choose to undertake learning activities to improve their presentation skills. This arms the students with an understanding of the principles of preparing and delivering effective and engaging presentations in a variety

of formats and to a variety of audiences. However this is one of the skills that requires practice to perfect.

The studios provide an opportunity to practice this through the standup product proposal pitch that students are required to do in stage 2 of the studio. In past studios, this has been a traditional and quite short presentation which provided a limited opportunity for students to practice their presentation skills. Each team has one chance to present, and although they will receive feedback, they don’t then have the opportunity to immediately act on that feedback and improve their presentation skills. They need to wait until the next time they are called upon to deliver a presentation, perhaps weeks later.

One of the authors (Valerie Gay) has spent several years developing an alternate presentation format that offers more scope for the students to develop their presentation skills, and is especially relevant for Studio Based Learning due to the focus on the delivery of a product. The presentation format described here was inspired by typical trade fairs where many organisations have a booth at the fair, and each organisation promotes their product by delivering a brief presentation and displaying materials to a roving audience. Typically the person working at a booth will present multiple times as new audience members arrive at the booth. Therefore the person working at the booth has a chance to refine their pitch through repetition. That person will also typically spend time visiting the other booths at the fair, and listening to the pitches of other organisations, picking up ideas for how to improve their own pitching skills. From this inspiration the format was adapted to optimise its pedagogical value.

The Roadshow presentation format shares some principles with a number of alternative meeting and presentation formats that have gained currency in recent times.

Pecha Kucha (Japanese for Chit Chat), is a format originally developed in 2003 by architects Mark Dytham and Astrid Klein as a way to ensure brevity in the presentations of young designers [10]. By constraining the presentation to twenty slides on a fixed timing of 20 seconds per slide, the method forces the presenter to distil and communicate the essence of their subject. A similar technique known as Lightning Talks has long been a regular feature of The Perl Conference [12]. The technique is also developing a following in educational settings as a way of developing presentation skills [22].

Speed Geeking [15] is organised as a number of stations, each with an “expert” at each station delivering a presentation on a topic to a small audience. The event is divided into a number short sessions moderated by a facilitator with audience members rotating from station to station for each session.

The World Café [30] is a structured conversational process set around a number of tables styled after a café. A predefined topic is allocated to each table and the participants are divided into small groups who circulate between the tables recording notes from their conversation which remain at the table to initiate further discussions by later visitors to the table. Recently,

the World Café method has been applied to the implementation of Project Based Learning by Nunez et al [19].

The Gallery Walk, like the World Café method is intended to allow a large group to consider a number of questions. Stations are set up around a room, each with a poster board on which is written a question. Participants are asked to think critically about the question and add their thoughts to the poster board. All participants visit all of the stations and at the end of the session a leader at each station summarises the collected reflections on each question.

#### *A. Details of the Roadshow presentation methodology*

After examining existing alternative presentation formats, what we describe here is our version, designed for students, and with pedagogical aims in mind. Our principal aim is to offer all students in the class the opportunity to practice their presentation skills, receive feedback, and have a chance to apply that feedback immediately and to hone their presentation skills through repetition. But equally importantly, to do this in a way that is fun and engaging, and can be delivered in either a face-to-face or remote online learning environment. The other pedagogical reason for creating our own format is our pedagogical goal to ensure that every student has an opportunity to be both a presenter and an audience member, so that every individual student has the opportunity to practice and improve both their presentation and their feedback skills.

The general outline of the process followed in a Roadshow presentation event is illustrated in Figure 1.

In the figure and the description below, we refer to “Tables”. When the Roadshow presentation format is used in a physical space, these may be actual tables in a large room, replicating the environment of a trade fair. In a remote, online learning environment, we retain the notion of a Table as a metaphor that students can identify with. However in online delivery, each Table refers to a virtual room that students can join and leave. The use of a metaphor not only makes it easier for students to understand what we are trying to achieve, it also makes the description platform-agnostic, and the basic principles can be adopted to any form of synchronous class interaction, either face-to-face or using one of a variety of online synchronous collaboration tools. The presentations may incorporate video content but should also require a live presentation component from each presenter.

Prior to running the Roadshow event it is necessary to decide upon and set up some aspects of the format in advance. Those aspects appear in the figure indicated with a “Predefined Process” element.

- The Table Assignment Rules determine how the students are allocated to tables as either presenters or audience members for each round. This will be in part determined by the desired outcome.
  - Presenting members are always at their home table.

- Audience team members may be assigned as a group to a table and then at some point swap roles with the members of their team who are presenting.
- We have also explored rules that split team members in the audience across multiple tables.
- Movement of the audience members may take the form of a simple rotation or some more complex process governed by a schedule.
- The table assignment rules may include rest time between some rounds to allow students to discuss what they have learned and adjust their presentations or feedback.
- The guidelines and processes for feedback from audience members to presenters and for team reflections should be established and clearly communicated prior to the event.
- Arrange Tables in a circuit
  - This may mean arranging tables in a circle in a single physical room or in some more complex physical arrangement, possibly across several rooms.
  - In an online environment, this can be done by assigning each virtual table (typically a breakout room or channel) a number, and students understand the sequence/circuit of table numbers.
- Assign each Team to a Home Table
  - The arrangement of teams to tables may depend on the individual team size and the Table Assignment Rules
- Assign some team members to Audience
  - Teams will always be split so that some team members are presenting, while some are in the audience at various tables. How this is done will depend on the Table Assignment Rules

#### *B. Integrating the Roadshow presentation style into Studio Based Learning*

The focus of the Roadshow presentations is on providing the opportunity for students to practice their presentation skills, and based on the direct and immediate feedback of their audience, to adjust their presentation and reflect on the impact of those adjustments based on subsequent audience feedback.

Sometimes grading can be a distraction when students are first exposed to new processes. By posing the roadshow as a learning opportunity which is not tied to a grade we free the students to focus on learning rather than optimising their grade. To ensure there is some incentive to use the learning opportunity effectively, students are made aware that the final product presentation at the end of the semester will be assessed and that the roadshow is an opportunity to improve their presentation skills in preparation for that.

As the audience members rotate at each round, audience members and presenters will occasionally change places giving every student the opportunity to:

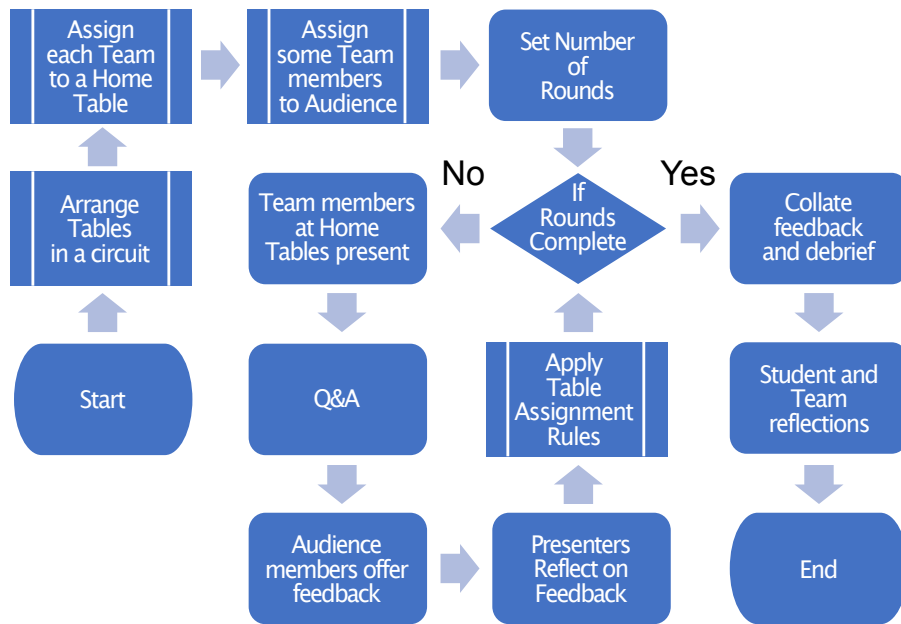


Fig. 1. A flow chart of the processes in a Roadshow event

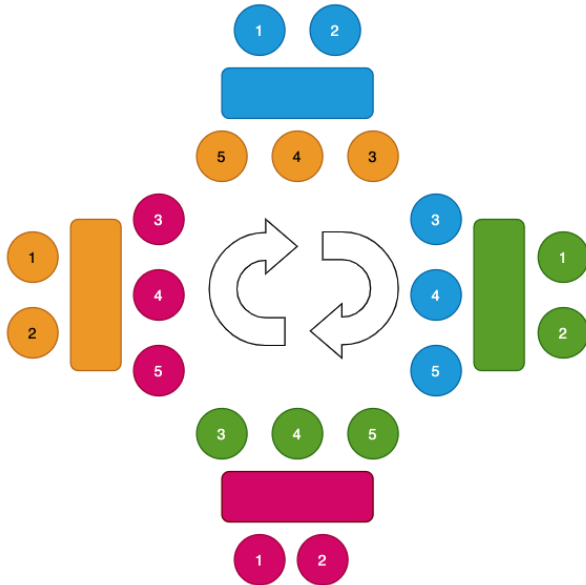


Fig. 2. Set up of a Roadshow event with team members remaining together

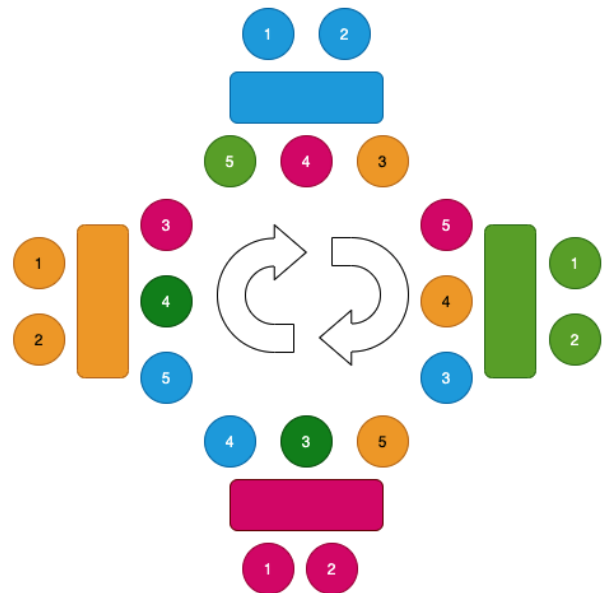


Fig. 3. Set up of a Roadshow event with mixed audience

- practice and refine their presentation skills, learning from the feedback they receive as a presenter;
- learn from other teams' presentation techniques while they are in the audience;

- develop their ability to provide constructive, critical and insightful feedback to others.

A typical arrangement of the tables is shown in Figure 2. This diagram shows presenters at the outside at their home tables



and audience members shown in the centre. In this version of the method, the members of each team remain together as they circulate around other tables. When they have seen all of the presentations, they swap with their fellow team members who have been presenting, possibly with a break to communicate what they have learned with their fellow team members.

Another version of the methodology is shown in Figure 3. In this version, the audience members at each table belong to different teams. This time, whenever a team member arrives at their own home table they swap with one of the team members who is presenting. This keeps a consistent number of both presenters and audience members and provides opportunities for the team to adapt their presentation based on what the team member changing roles from audience member to presenter has learned from the other presentations they have seen up to that point.

For online implementations of the method, tools that offer synchronous class interaction can be adopted to represent tables. We considered two alternative synchronous collaboration tools – Zoom and Microsoft Teams. Both can support breakout rooms during online meetings, however Microsoft Teams additionally has the option of setting up different channels, and each channel can host its own meeting.

For our trial of the Roadshow presentation format, we chose to use Microsoft Teams with each table being represented by a separate channel. We did not use breakout rooms. The benefit of this approach is that student teams feel a sense of ownership over their table (Microsoft Teams channel). Just like in a real trade fair (or a face to face version of the Roadshow in a classroom), students can add additional features to their booth, like a virtual product brochure, or a participant survey to gather feedback. We felt that using breakout rooms would not afford students this level of customisation, and they may lose the sense of ownership that comes with being responsible for their own virtual space.

On the other hand, one of the challenges of running the Roadshow presentation format is ensuring that students are at the right table at the right time. The use of breakout rooms in Zoom and Microsoft Teams does offer the option to automatically allocate students to tables at each rotation, thus removing the confusion that can sometimes arise when the scheduling becomes more complex. While we have not tried this approach, it could be an interesting future research study to compare the two approaches.

## VII. STUDENT FEEDBACK AND SURVEY

Over the years that she has been developing the method, Dr Gay has collected qualitative student feedback from participants in a range of subjects to help evaluate the method and make improvements for future iterations.

“I enjoyed all the pitches, I would invest in almost all of them, overall, the videos were great quality and everyone had great ideas”.

“I really liked this method of presenting! All audience members were engaged and gave great feedback.”

“Worked very smoothly, although completely online.”

“Was great! Really engaging, but go a bit tired towards the end.”

For the introduction of the method to the Data and Electronics Engineering Studios this year, we conducted a quantitative survey of the students experience after the event and asked students five questions for which we requested a numerical rating as well as allowing students to suggest one thing they might change about the roadshow format.

- 1) How would you rate the complexity of the process used in your session?
- 2) How helpful was the repetition in developing your presentation skills?
- 3) How helpful was the feedback you received?
- 4) How likely would you be to recommend this presentation method in other subjects?
- 5) Did you learn more about presentation skills from being in the audience (0) or presenting (10)
- 6) What one thing would you change about the format?

There were 120 students who participated in the roadshow event across six studio subjects which was run as 3 cohorts (Fundamentals, Applications and Professionals). We ran the Fundamentals sessions with an approach like that illustrated in Fig. 3 while the Applications and Professional Sessions were run with an approach like that illustrated in Fig. 2. The survey was voluntary but we did receive 29 responses representing around 20-30% of the students in each cohort.

The difference in the perceived complexity of the method may be a result of this but might also be a result of the fact that the Fundamentals students were first year students while the Applications and Professional students are more senior.

The vast majority of students clearly found the opportunity to repeat their presentation and the immediate feedback from the audience, to be valuable and found that they learned from both presenting and participating in the audience. It was also interesting to observe that many students would recommend the method for other subjects. These are strong affirmations of the value of the method.

It is clear from the feedback that, most students welcomed this fun, engaging, well-organised and participatory approach. Students who were initially sceptical about this approach were convinced after experiencing it. Critical comments about the Roadshow presentations related to time and timing. When run online, some students found the session too long and suggested adding 1 or 2 minutes to existing breaks. Others suggested allowing a few more minutes of reflection time in-between presentations to improve the presentations for the next rotation. Some of the Fundamentals students found the scheduling confusing and suggested clearer scheduling as an area for improvement. Time limitations meant that students

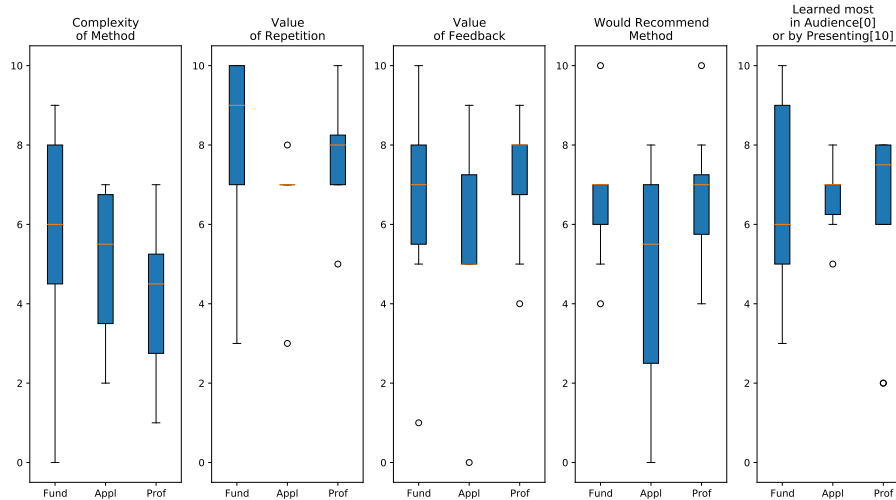


Fig. 4. Box plots of the results from the feedback survey conducted after the roadshow. Each plot summarises the responses to one of the questions we asked and separates the results from the Fundamentals [first year], Applications [2nd and 3rd year] and Professionals [3rd and 4th year] students

did not visit all of the tables and this was seen as a problem by some students. This is valuable feedback that we can take to the next iteration of this approach.

## VIII. CONCLUSIONS AND FUTURE PLANS

From a faculty perspective, the approach did deliver on our pedagogical aims. Firstly, students delivered their presentation multiple times on the same day, and had the opportunity to improve based on feedback they received, as well as make improvements to their own pitching style based on their observation of others as audience members.

Secondly, every student had the opportunity to present, and therefore practice their presentation skills. In the previous pitching method, where each team pitched only once to the combined audience, often some team members didn't get to present at all or had a very minor role in the presentation, due to the limited time available. In the roadshow format, every student was required to deliver a major part of the pitch at some point in the roadshow.

A side effect of having rotating presenters also meant that every team member needed to have a working knowledge of every part of the product proposal. In the previous pitching method, each student really only needed to be familiar with their own part of the pitch, and could rely on their team members for the parts they were unfamiliar with. The roadshow format required teams to communicate more with each other while preparing for the roadshow, and to share knowledge within the team so that every team member was capable of delivering the whole pitch on their own, and was able to answer audience questions, if required, even on parts of the product they weren't personally working on. So apart from improving students' presentation skills, our observation

is that the roadshow format also increased students' intra-team communication skills early in the semester, a skill which teams hopefully retained throughout the rest of the semester.

Finally, as faculty we were looking for a more fun and engaging way for students to present their product proposals and watch other presentations in an online learning environment, rather than sit passively in an online classroom for several hours listening to teams present one after another. Based on student feedback, we believe we achieved the goal of making the presentations more enjoyable as an audience member, and we were able to engage students as active learners in the experience, by the need to move between tables and change roles.

In the future, we plan to retain and continue to evolve the roadshow model for student presentations, and we recommend it to other academic colleagues to try as well, as a method for improving students' presentation and communication skills.

One area of future work is to refine the process used to assign students to tables at each rotation. If there are different numbers of members in each team, the scheduling needs to ensure that the number of students in the audience at each table is reasonably balanced and this can be challenging, particularly using the mixed audience approach illustrated in Fig. 2 or if some of the teams have only three members. In an online delivery mode it may be possible to automate the allocation of audience members to "tables", allowing for more complex allocation schemes that better optimise the experience for the students.

Another area of future work is to explore what this method might look like in hybrid face-to-face and online learning environments. In other words, where some students are physically present in a classroom while other students are participating

in the class online. So far, we have used the method in cases where students are either all physically present, or all online, and both of these approaches have proven to work well. The use of the trade fair metaphor, and the metaphor of tables, helped students to grasp the method when used online. We expect though that the method would be more challenging to adapt to hybrid learning environments.

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