Introduction

One of the key challenges in teaching and learning within a school of engineering in universities is in the provision of timely and useful feedback to students. In particular, it is a challenge for instructors to assess oral-presentations in real-time and then to be able to provide timely, well-written, personalised and useful feedback. Often undergraduate students are limited to making one or two 5-minute presentations in front of the rest of the class. When a presentation only lasts for 5 minutes it becomes difficult for the instructor to both listen and view the presentation while taking notes for developing feedback later. Realistically, in such a brief time period with student following student, the instructor has little time to do more than score the presentation and jot down a few key points. It appears that there is yet to be developed a comprehensive mobile application that can assist academics in conducting assessments and providing rapid feedback to students for oral presentations.

The aim of this project was therefore to address the research question: *How can instructors assess in 'real time' and provide fast and effective feedback to students for improved teaching and learning outcomes?* To this effect, we designed and developed an iPad application for oral presentations called RAPID FEEDBACK to help *both:* (1) academics to assess and provide fast and enhanced feedback in real time and (2) students to receive timely, personalised and quality feedback on their oral presentations that allows them to reflect on their work and learn from it.

Related Work

Existing literature suggests that good feedback in educational contexts can significantly improve learning processes and outcomes, if delivered in an effective way (Duncan-Howell & Lee 2007; Narciss & Huth, 2004). Feedback must focus on: learning; be linked to the purpose of the assignment and to criteria; and should be understandable to students (Bryan & Clegg 2006). Further, feedback is worth little if it does not provide reflective learning and is not received on time. Nevertheless, providing effective feedback has always been a challenge for academics, especially with increased student numbers and class sizes.

Furthermore, with the growing use of tablets like iPads and similar mobile devices, students are increasingly becoming 'on the go' learners or mobile learners. To this effect, mobile learning (m-learning) has become important in universities and is considered as an extension to the more traditional e-learning environments for enhancing teaching and student learning (Cox & Marshall 2007; Sharples 2003; Hwanga & Chang 2011). However, there is a lack of standard set of applications or tools to support such mobile teaching and learning in e-learning environments (Lalita 2011), especially in assessing and providing timely and effective feedback. In particular, accreditation boards for engineering, businesses and industries are pushing for engineering graduates to develop their oral and written communication skills since a majority of their time is spent communicating with peers (Piirto 2000). Yet, studies report that these oral communication skills are being inadequately developed in engineering courses and curricula nationwide (Darling & Dannels 2003; Bjorklund & Colbeck 2001). With growing student numbers and class sizes, it is therefore crucial that the nature of feedback is re-examined, and how it could be provided, in relation to its effectiveness in supporting learning processes (Nicol & Macfarlane-Dick 2006).

Approach

In order to address the research question: *How can instructors assess in 'real time' and provide fast and effective feedback to students for improved teaching and learning outcomes?* a two phased approach was undertaken: (1) design and develop an iPad

application that allows instructors to quickly develop and deliver timely feedback to students making oral presentations and (2) evaluate the benefits of the tool to *both* academics and students for effective teaching and learning outcomes.

Phase 1: Design and development of the app

We designed and developed an interactive mobile application called RAPID FEEDBACK that allows instructors to assess students during their oral presentation and then provides tailored and detailed feedback immediately or as early as possible. The app consist of three modules that an instructor uses as a simple three step process as shown in Figure 1: (1) Step 1 - Administration: setting up a project, capturing student lists, forming groups and setting up marking schema with appropriate weighting; (2) Step 2 - Real time assessment: during the presentation the instructor is able to score the student's presentation across a number of criteria in-built within the app; the instructor is also able to select a number of different comments to form the written feedback to the student from an extensive list of over 200 built-in comments provided in the app or can customise or create comments; (3) Step 3 - Review and report: once the assessment is complete, a report is generated with the numerical score and personalised written comments and; the report can be e-mailed to students directly or to the instructor for ensuring accuracy before onward e-mailing to individual students. It must be noted that the pool of comments in-built within the app allowed instructors to provide positive, neutral and constructive criticism.

Figure 1: Rapid feedback app main screen showing three modules which should be used in order

Step 1 - Administration module: This module should be set up before a real time assessment is conducted. The administration module includes: creating a new project; capturing/adding student lists and forming groups/teams; setting up marking criteria with appropriate weighting and; managing assessors.

Creating a new project: Using a drop down menu, the instructor may select the Create New Project option. A dialogue box is opened that allows the instructor to project description and the name of the subject in which the assessment is being carried out. The app records previous subjects and allows the instructor to re-use an existing subject or create a new subject (see Figure 2). The app includes a timer that allows the instructor to pre-set how long the presentation should be. The default period for presentations are 5 minutes with a warning indication set to occur when just 30 seconds remains. But the instructor can customise the timer to suit the assessment criteria.

Capturing/Adding student lists and forming groups/teams: Using the administration screen, candidate data may be entered, using the menu and selecting Add New Candidate or importing a list from an Excel spread sheet using Import Candidate Details option (Figures 3 and 4).

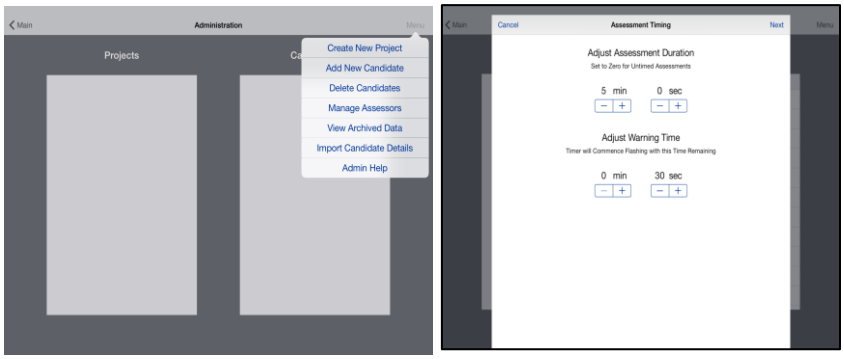


Figure 2: Screens for creating a new project (left) and pre-set the presentation timer (right)

For team or group presentations in a specific project, the instructor may select Create New Group option from the menu in administrative panel, give it a name and select candidates in the group using the Edit button (see Figure 4).

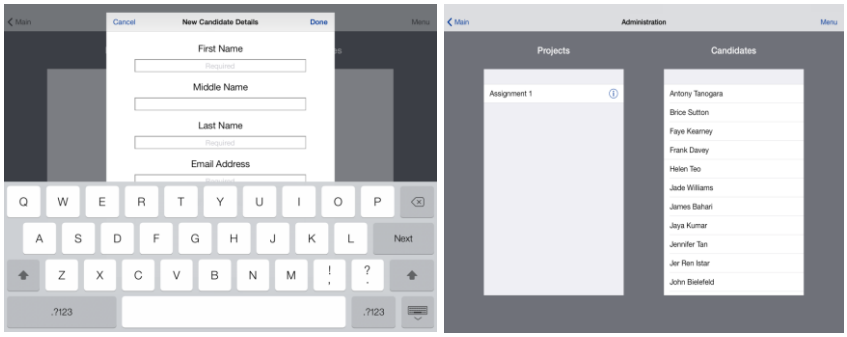
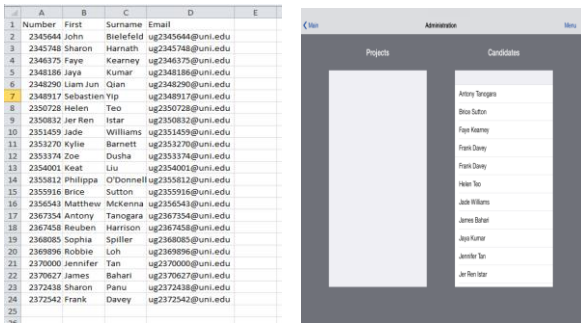


Figure 3: Screens for adding individual students (left) and assigning students to groups (right).

Setting up marking criteria with appropriate weighting: The app allows an instructor to select from four criteria, against which the feedback will be given: feedback with/without numerical grade to an individual candidate; feedback with/without numerical grade so that all candidates in a group receive the same grades and comments.



	A	B	C	D	E
1	Number	First	Surname	Email	
2	2345644	John	Bielefeld	ug2345644@uni.edu	
3	2345748	Sharon	Harnath	ug2345748@uni.edu	
4	2346375	Faye	Kearney	ug2346375@uni.edu	
5	2348186	Jaya	Kumar	ug2348186@uni.edu	
6	2348290	Liam Jun	Qian	ug2348290@uni.edu	
7	2348917	Sebastien	Yip	ug2348917@uni.edu	
8	2350728	Helen	Teo	ug2350728@uni.edu	
9	2350832	Jer Ren	Istar	ug2350832@uni.edu	
10	2351459	Jade	Williams	ug2351459@uni.edu	
11	2353270	Kylie	Barnett	ug2353270@uni.edu	
12	2353374	Zoe	Dusha	ug2353374@uni.edu	
13	2354001	Keat	Liu	ug2354001@uni.edu	
14	2355812	Philippa	O'Donnell	ug2355812@uni.edu	
15	2355916	Brice	Sutton	ug2355916@uni.edu	
16	2356543	Matthew	McKenna	ug2356543@uni.edu	
17	2367354	Antony	Tanogara	ug2367354@uni.edu	
18	2367458	Reuben	Harrison	ug2367458@uni.edu	
19	2368085	Sophia	Spiller	ug2368085@uni.edu	
20	2369896	Robbie	Loh	ug2369896@uni.edu	
21	2370000	Jennifer	Tan	ug2370000@uni.edu	
22	2370627	James	Bahari	ug2370627@uni.edu	
23	2372438	Sharon	Panu	ug2372438@uni.edu	
24	2372542	Frank	Davey	ug2372542@uni.edu	
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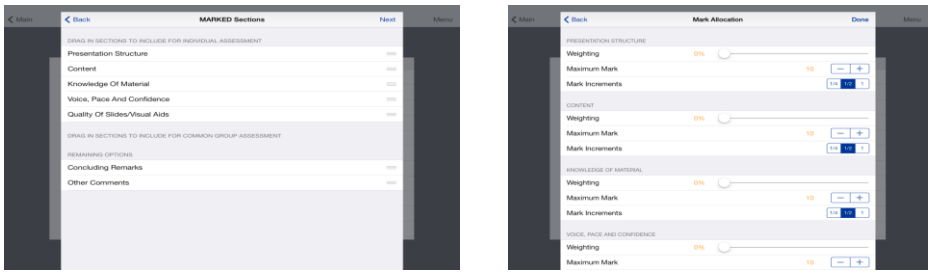
Figure 4: A list of students may be imported from a spreadsheet (left) into the database (right)

Furthermore, the app allows the instructor to choose and customise the assessment criteria on the oral presentations from a list of 7 criteria – voice, pace and confidence; presentation structure; quality of slides/visual aids; knowledge of the material; content; concluding remarks and; other comments. Figure 5 shows an example where we have chosen to provide individual feedback and grades on five criteria by simply touching the right end of criteria bar and sliding it up.



Figures 5: Screens for selecting the marking criteria (left) and setting the weightings (right).

Once the required criteria have been selected, the instructor is informed to set up the numerical grades for each criterion that is to be evaluated (see Figure 5). Using the slider, the instructor can easily specify the weighting for each criterion.

Step 2 - Real time assessment: To begin the real time assessment, Step 2 - the Real Time Assessment module is tapped. The project that has been created in Step 1 is now ready for assessment. The project is selected and the specific group must also be selected. Once a candidate in the group is selected, this candidate is ready for assessment. Figure 6 (left) shows the assessment screen that includes the assessment criteria, a grading slider and a Comments feature.

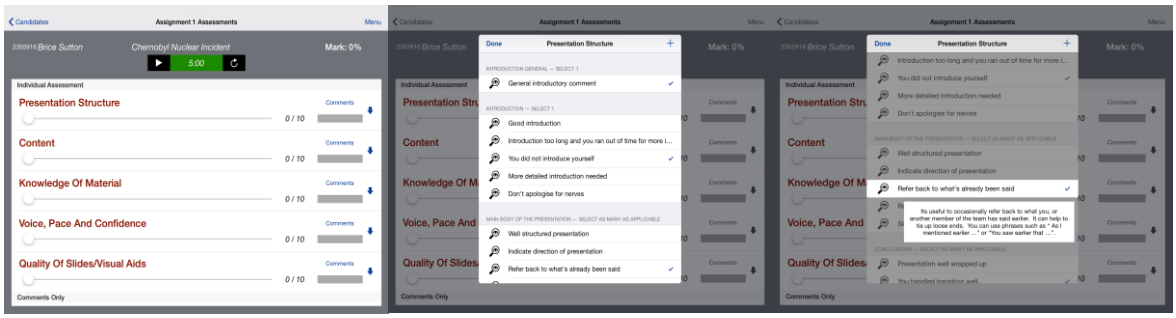


Figure 6: The main assessment screen (left), selecting the comments against a criteria (centre) and seeing the expanded comments (right).

A tap on the Comments feature brings up a list of in-built comments that an instructor can scroll up or down and choose from, for the assessment. There are around 200 in-built comments available in the database. And, most comments in the in-built database have more than one version of the same comment. The version used in the comments sent to the candidate is selected at random from one, two or three alternatives available. The comments are shown on the screen as a one liner but can be expanded to read the full version of the comment by using an inspection icon (see Figure 6 (centre and right) for comments).

If it becomes necessary to add a comment that is not in the comments database, the instructor can tap on the Comment bank (as shown in Figure 7 (left)) to add a new comment. In addition to the comments, it is useful to note that some of the comments in the Concluding Remarks section use the name of the candidate to personalise the report. See for example in Figure 7 (left), the students first name appears in the comments where the $name$ placeholder is located. Once the assessment is done, the instructor can return to the Step 3 – review and report module.

On returning to the main assessment screen, the comments bar shows three colours depending on the type of comment that has been chosen. Each comment selected has a colour associated with it with green linked to positive comments, red to negative comments and yellow to neutral or constructive comments. This visualisation may be used as an aid in scoring each criterion. Then slider is then used to score the attribute. Once the scoring is complete, the colour of the criteria name turns green to indicate that the aspect of scoring

has been completed. Figures 7 (right) illustrate the assessment screen with comments and colours. At any time during the scoring process, the instructor is allowed to revisit them and can make changes if required. Once the scoring is complete, a final percentage score is automatically calculated and displayed on the right hand corner of the screen.

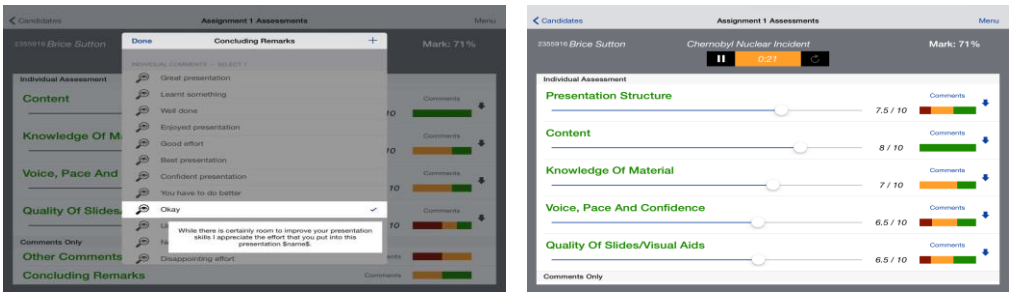


Figure 7: Customised comments (left); As the criteria are assessed the title changes to green and the type of comment selected is shown in the colour bar (right).

Step 3 - Review and reports: In the Review and report module, the instructor has the option to: Edit Assessment; Update Custom Comments; Add an Audio Recording; Adjust Assessment Date; Email to Candidate Only; Email to Me and; Email to Candidate and Me as shown in Figures 8). An instructor can send a student not only a report in PDF form but also can add a short audio comment. A tap on the Add an Audio Recording button allows the instructor to record an audio comment for the student. Further, the Export Results feature in Figure 9 exports the entire class of reports to the either of the following: email to assessors; email to candidate or both assessor and candidate.

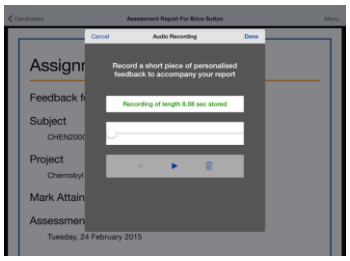


Figure 8: Audio comments can be added to the PDF comment file e-mailed to student.

Phase 2: User testing and evaluation of the app

With ethics clearance, in phase 2, we tested the iPad app for its scalability and reliability, on approximately thousand oral presentations across three first year subjects in the school of engineering. Further, to test for robustness and its adaptability, we trialled the app in two non-engineering departments (1 in Nursing and 1 in Dentistry). The five academics that were a part of the app test were then invited to provide feedback via email on their experiences of using the app in real time.

Our aim was also to seek student feedback and views on the effectiveness of this method of providing feedback to them and also the impact of this feedback on their learning experiences. We invited students from the two first year chemical engineering subjects who received feedback on their oral presentations using the app in Semester 1 and 2 of 2014, to take part in a survey. Eighty-three (83) students agreed to participate in the survey. Furthermore, students were invited to participate in a focus group to gain deeper understanding about their views on the usefulness and timeliness of the feedback they received through RAPID FEEDBACK. Twelve students agreed to participate in the focus groups. During the focus group, student experiences, perceptions, like and dislikes about the feedback they received for their oral presentations were discussed. The focus group sessions were audio-recorded and transcribed.

From the survey data, emails and the transcribed focus group recordings, context analysis was performed to gain deep understanding and explanation about the themes and patterns that emerged from participants' expectations, likes and dislikes about the feedback mechanism. This understanding helped us verify the effectiveness of this new method of dissipating feedback among students. In the next section, we present our results, based on the data we collected as a part of testing and evaluating the app.

Results

We tested the iPad app on approximately three thousand oral presentations across three early year subjects in the Melbourne School of Engineering. We then invited students to participate in a survey and eighty-three (83) students agreed to participate. Table 1 shows student responses to receiving feedback via the RAPID FEEDBACK app. We found that almost all students (92%) liked receiving feedback via email. While 21 out of the 83 students felt that getting feedback after a week was not an issue, most students (50%) appreciated receiving one as early as possible. It was also noted that around 85% of the students provided a positive response about the personalised, detailed and useful feedback that they had received. Further, it seemed that receiving detailed and useful feedback to help them identify areas for improvement in oral presentations was noted to be crucial in student learning outcomes.

In order to gain deeper understanding about student views on: what feedback means to a student, and the usefulness and timeliness of the feedback they received through the RAPID FEEDBACK app, we analysed the data collected from the two focus groups (12 participants).

For some students' feedback meant:

- *"Feedback is something that you can improve in your learning.*
- *"Feedback actually can point out what are our weaknesses and what's our highlight point. It can help us to improve our future presentations"*.
- *"Feedback is more than just a mark, it's a way to improve on what you did wrong"*.

Students liked receiving feedback via email. For example, some participants said:

- *"I remember receiving it and thinking wow that's quite good".*
- *"This is quite convenient actually…you don't have to actually go to the person [lecturer] because you have to find time and then the lecturer has to find time to see each other"*.
- "*Well I think as an international student especially for student whose first language is not English we find face to face much harder because there's language barrier so you might not clearly understand what actually the lecturer is talking about. Instead using the written form of feedback basically you will understand more clearly"*.

When students were asked about the timeliness of receiving feedback via the app, they said:

- *"I feel that the usefulness of feedback drops off the longer it takes for you to get feedback because, well like for the presentation, if you got feedback right the second after you did the presentation then obviously you'll remember the most about what you've actually been doing and so it'll be the most relevant. But say if you only get your feedback two weeks later, by that time, you might have forgotten parts of what you were presenting about and that wouldn't be as useful"*.

They felt that the feedback was personalised and their overall experience was positive:

- *"I mean this for me is pretty personalised…like it specifically points out things that I did and didn't do and I like it, like that's pretty personal for me".*
- "*I think this program for presentations is pretty good"* or *"I think this is pretty spot on like the amount of feedback in terms of personalisation and quantity"*.
- *"Let's put it this way it's far better than anything else I've received during my time here".*

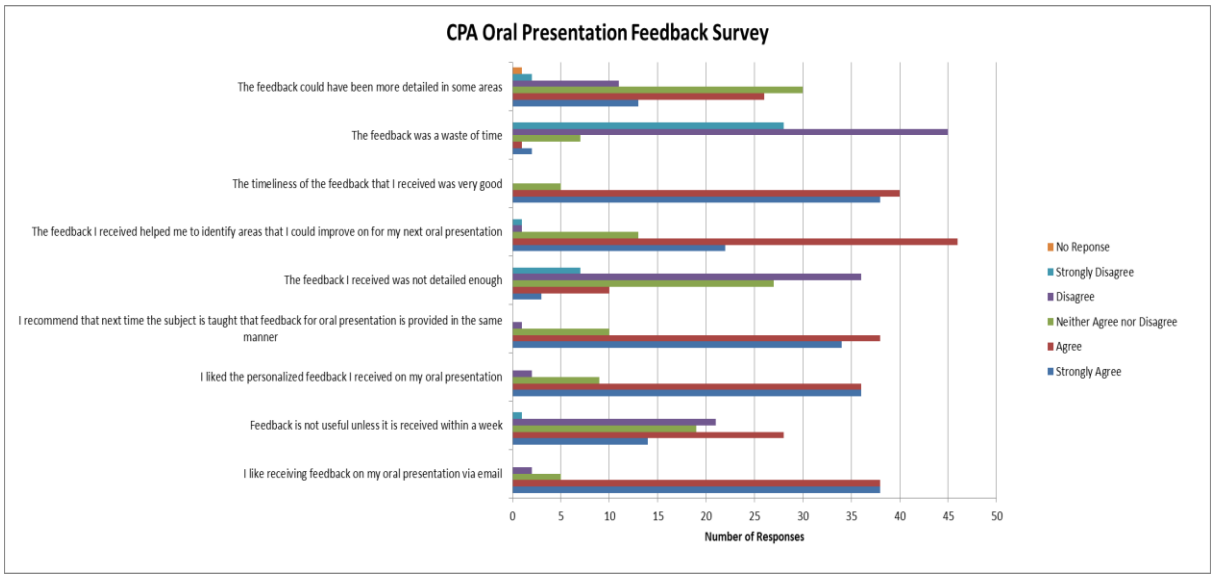


Table 1: Student responses to the feedback via RAPID FEEDBACK app

Furthermore, the data collected from the questionnaire responses from five academics via email about their experiences of using the app in real time was transcribed and analysed for themes and patterns. Our results show that the academics were positive in adopting the app. For example:

- *"It is a good feedback mechanism for students because they get personalized feedback sent to their email. They receive almost instant feedback, while their presentation is still fresh in their mind"*.
- *"From a tutor's point of view, the assessing process is greatly simplified"* or *"It is paperless and cost savings"* and *" it is easy to use and assign scores".*
- *"It is easy editing changes while grading student presentations. Also, it saves the effort and time spent manually writing comments"*.
- *"The written comments were comprehensive. There are a large number of comments to choose from*" and *"the pre-written comments are helpful…it did reduce paper clutter"*.
- *"Yes, the presentation criteria were well covered".*
- *"I am impressed with the personalized feedback to students via email".*

Discussion and Conclusion

In this section, we reflect on the research question: *How can instructors assess in 'real time' and provide fast and effective feedback to students for improved teaching and learning outcomes?* In addressing this question, we designed and developed 'RAPID FEEDBACK', an iPad app to improve the quality of *real time* assessment and to provide timely and effective feedback for student-led oral presentations. Based on our findings, it seems the app is a solution to the challenges we face as instructors in providing timely, useful and precise feedback to students during oral presentations.

Are students able to access their feedback in a timely fashion, from anywhere? Based on our evaluation of the app as discussed earlier, students were able to access their feedback via emails and there was an over-whelming response (92% positively responded to it).

Do students feel that the feedback is personalized, precise and useful in improving their learning outcomes? The evaluation of the app showed us that students responded positively to the personalisation of the app and found that the feedback was elaborate and helped identify areas for improvement.

Does this tool allow instructors to provide tailored and detailed feedback within a day of the presentation? The ability for instructors to either select a number of different in-built comments to form a written feedback and/or be able to create customised, re-usable comments was a success using this app.

During the presentation, is the instructor able to score the student's presentation across a number of criteria that is tailored to the subject? This app has allowed instructors to assess students in real-time across a number of criteria. It allows the instructor to score the student's performance and presentation across up to six criteria.

Is using the iPad application an effective use of time for academics? Based on our results, the app saved academics time and made their assessment task simple and effortless.

In conclusion, our evidence shows a positive response from students and a fervent uptake of the tool by academics. We propose that this tool, with little or no modifications, can have a positive impact on the way we provide feedback and engage our teaching and learning practices across disciplines in schools and universities. Our future work includes repurposing this app to accommodate across disciplinary assessments in dentistry, health science and music within the university. We are also in the process of re-purposing the app to other assessment applications including to nursing, optometry and reflective practice.

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