

1-1-2011

## Using iPad2 to Assess Students' Live Performances and Actively Engage Students With Tutor and Peer Feedback

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This is an Author's Accepted Manuscript of: Wren, J. J., Campbell, A. B., Heyworth, J. N., & Lovering, C. A. (2011). Using iPad2 to assess students' live performances and actively engage students with tutor and peer feedback. Paper presented at the Create World Conference. Brisbane, Australia. Available [here](#)  
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# Using iPad2 to assess students' live performances and actively engage students with feedback

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## Abstract

Assessing student live performances can be challenging because markers need to make quick and often complex judgements about the learning while at the same time record information and watch the performance. This is further challenged where multiple markers are involved and moderation between markers is required. Maintaining fairness and validity throughout the assessment process can consequently become a significant issue.

Moderation of assessment can cause a delay in the turnaround time for student feedback because markers need to meet and review. In addition, the 'busy type of work' associated with compiling and sorting individual marks and distributing them to students, often further delays this process.

This paper describes a two phase, qualitative, action research project which trialled the use of an innovative digital tool to streamline the assessment process when assessing live performances. Phase one involved the assessment of arts performances of 170 Bachelor of Education students and phase two involved 200 students. For each phase, the students were enrolled in a 12 week Arts Education unit in the third year of their course and were assessed in groups of 5 or 6 students.

The digital assessment tool enabled each marker wireless access to a customised database during marking and moderation. Markers used laptops in phase one of the study, then iPad2 in phase two, as it enabled mobility during assessment. Each group's performance video was embedded into their marking key. This made it quick and easy to locate and view. The digital tool automatically saved and collated data. At the completion of the marking and moderation period, the marking key with markers' feedback as well as the embedded video of performance were automatically emailed to individuals as a pdf attachment. Individuals only received the feedback pertaining to their own group's performance.

The markers reported that the digital tool significantly enhanced the way in which they were able to capture and record their observations of complex learning. They felt that the assessment was more accurate and that the paperless process was far more efficient. The students reported that they became more engaged with the assessment process and that they engaged with their feedback on multiple occasions.

**Keywords** – digital assessment, iPad2, peer assessment, cloud

## Introduction

Our students are Bachelor of Education pre-service teachers. When they graduate, they will teach all the curriculum areas and work with children aged from 4 – 13 years. Our students are required to study visual art, drama and music education in the third year of this course. They are assessed in a range of ways. One of these is a short dramatic live performance, which they prepare and present collaboratively within a group.

Performance based assessment is specifically chosen here, as it is best suited and most appropriate for assessing our students' complex intellectual and psychosocial knowledge and skills (Clarke-Midura & Dede, 2010). The challenge of capturing deep learning and recording it is particularly problematic where the performances are short and ephemeral; such as a speech, a song, a dance or a play. It is easy for markers to

get distracted by the need to write/type information about the learning *in situ* (often in low-light conditions) or the need to communicate with other markers to discuss immediate impressions. These types of activities during performance often distract both markers and performers and increases inaccuracies in marking.

Providing timely feedback to students is crucial as research shows that formative feedback soon after the performance is far more effective to learning than if it is delayed (Wiggins, 1993). We found that giving feedback to large numbers of students became significantly delayed by the 'behind the scenes' assessment process we had in place. This process included the scheduling of face to face moderation meetings with markers, searching for and locating videos of performances to review, manual sorting and amalgamation of assessment records from the three markers, as well as printing and manually distributing marks and feedback to students. Transferring individual student's marks from spreadsheet records onto university mark-submission forms created time consuming data entry type of work. The markers felt that these type of tasks consumed time from the more productive and professional work associated with assessing. Consequently, they perceived dissatisfaction with the assessment process.

Quality of feedback is crucial (Earl, 2003) if it is to enhance learning. Yet, like many educators, we constantly found that despite our best efforts, many of our students did not fully engage with the feedback that we carefully crafted for them. Instead, they seemed focused on the final mark (McGuire, 2005). Students told us that they felt external to and therefore disengaged with the assessment process because it was directed by the markers. Wren, Sparrow, Northcote and Sharp (2009) found that higher education students expressed greater anxiety and dissatisfaction with their assessment when they felt external to the assessment process. Disengagement of students to their feedback was a significant issue for the markers and the students.

Both phases of this project involved large cohorts of students with 170 in phase one and 200 in phase two. Ensuring that the assessment was fair, valid and consistent whilst conducted efficiently was a significant challenge. This was particularly so because it involved three markers (who were also the tutors) marking the same performances simultaneously. Each marker assessed against the same criteria (creativity, skills, group work) but within a different art form (art, music, drama) which in turn has its own content.

## **Aims of this study**

### *Mobility during assessment of live performances*

We sought to develop more efficient and effective methods of assessing performance-based learning where multiple markers and a large number of student groups are involved. During this type of assessment, markers were required to move about the room to gain best views of each performance. We needed to use portable and wireless technology which maximised the time markers' eyes were on the performance rather than the marking keys.

### *Easy and quick access to videos of each performance*

Markers agreed that the most authentic and reliable method of capturing evidence of students' learning in this context was to assess *in situ*; during the live performances. However, markers were concerned that they may not adequately remember details of each performance, given that performances are ephemeral. They felt that quick and easy access to videos soon after the live performance would enhance their reliability and fairness of assessment. Our aim was to establish methods of creating easy access to videos by embedding them beside the group's electronic marking key soon after each performance so markers had instant access for the purposes of reviewing and moderating.

### *Moderation expediency*

We found that moderation of assessment to be far more reliable when conducted as close as possible in time to the live performance. We aimed to expedite the moderation process by creating access to online discussion between markers immediately after each live performance and over several days afterwards, when the videos were reviewed. As the primary assessment was conducted during the live performances, videos were used for review purposes and often did not need to be watched in their entirety. Which videos were selected for review was dependent on what further assessment information was required by each marker. Our aim was to make all videos quickly accessible without the need to search for them.

### *Giving timely feedback to students*

The three markers found that existing assessment processes caused extensive delays with feedback. Often, by the time the students received their feedback their interest and excitement about their performances had waned as they had moved on to other assigned work. The feedback was then not utilized by them and the carefully crafted advice from the markers was largely overlooked and not used. We aimed to streamline our feedback turnaround time so the students received their feedback within a few days after their performance when it was still fresh in their mind and they were most likely to engage with it.

At the time of performance assessment, many students reported to us that they felt nervous and introspective and unable to gauge with certainty the quality of their performance that they had prepared. We aimed to create assessment *as* and *for* learning. It needed to be explicit yet not constrictive so students could gauge their own levels of learning achievement.

This effort for ‘digitalising’ the process of assessing performance was a two phase study. We have now completed both phases.

Phase one research questions were:

- To what extent can the marking of student performances be streamlined by allowing each tutor to instantly see each other’s marks and comments at the time of marking (during the performance) and to enable tutors to communicate with each other via the web, rather than in person during the performance;
- How effectively can the moderation of performances be conducted via the web so that tutors do not need to have face-to-face meetings but rather review and modify their marking by communicating with each other via the web at times suitable to each tutor;
- To what extent can the feedback process be made more educative by embedding the video of each group’s performance into the marking key so that students can view their performance and engage with the tutor’s marks and comments which are placed directly beside the video;
- What is the impact on turn-around time for feedback and marks for the ‘digitalised’ process which includes having the marking keys and videos emailed to students?

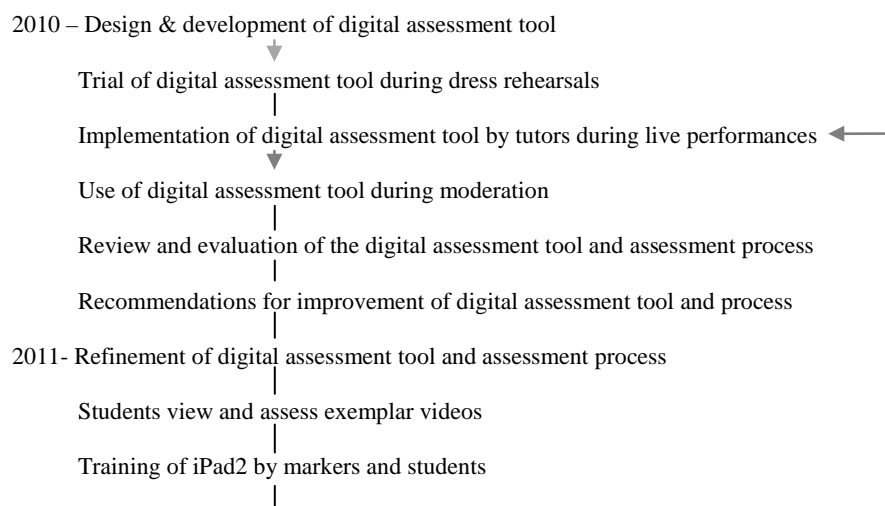
Phase two of research questions were:

- To what extent can mobile technology be used by tutors and students to enable them to safely (without cables) access best viewing points around the room during performances;
- To what extent can peers be engaged with the assessment process by being included in the live marking and to what extent is it technologically feasible to make their comments and marks instantly visible to tutors during the marking;
- How beneficial is it to enable the access and sharing of recorded videos to streamline the assessment process?

### **Methodology**

We employed qualitative action research. Action research is most suited to this project as it requires the teacher/s to be the researcher/s, working collaboratively in a partnership with one another, the students and technical staff. All were to engage with critical analysis through reflection and to systematically collect evidence to bring about an immediate, innovative change to their practice to enhance learning of students (Cohen, Manion & Morrison, 2011; Wisker, 2001). A cyclical timeline was developed which involved the design, trialing, evaluating and improving the assessment tool. The project was evaluated throughout the semester with the coordinator, tutors and students being interviewed individually and/or through focus group discussions (in phase one). The students also completed a voluntary survey at the end of the semester (in phase two).

### Action research cycle over two years



## Participants

### *Pre-service teachers*

Phase one: 170 teacher education students in the third year of a four year program in 2010.

Phase two: a new cohort of 200, third year education students in the same program in 2011. The students' performances were assessed in groups of 5 or 6 students. There were 28 groups in 2010 and 36 groups in 2011.

### *Marker/Tutor participants*

The markers in this study were the tutors in the program. In 2010 the three tutors each taught a different aspect of the arts (music or drama or visual art). In 2011, the music and visual art tutors who taught in 2010 were teaching again, but the drama tutor was new. However, the previous drama tutor (although teaching elsewhere in 2011) was still involved with the reflective practices of this project.

## The research project

We designed a digital assessment tool and through two phases of the project's action research we trialled and refined it. Reflecting upon and learning from our experiences in phase one of the project, as outlined in 'Improving marking of live performances involving multiple markers assessing different aspects' (Wren, Campbell, Heyworth & Bartlett, 2010), we made a number of changes with the most significant being moving from lap top computers to touch screen technology of an iPad2. This provided us with portability and mobility while assessing. The touch technology meant that our eyes remained on the performance for most of the time, rather than a computer screen and keyboard. Touching the screen minimised the amount of typing required as markers were able to highlight relevant boxes on the rubric, copy/paste and import comments from a comments bank with a quick glance and a quick tap on the screen. The marking key also provided a space for each of the markers to type in additional comments if needed, which was generally done immediately after live performance or added in during the time of moderation when videos of performances were reviewed. We chose to have this feature for the occasional situations where markers felt that the learners needed more targeted feedback. Quality and precise feedback enables better communication about the learning (Absolum, Munro-Keene & Phillips, 2009) and enhanced motivation towards the learning (Denton, 2001). The content of the rubric and the comment bank were in most cases sufficiently comprehensive.

Information was automatically saved and markers had simultaneous access to each other's comments at any point in time. In addition, at the tap of a finger, each marker had access to the whole cohort marks spreadsheet. The spreadsheet provided a quick view of the criteria marks as well as total marks throughout the marking process. This enabled individual markers to compare how they were marking across groups and

in comparison to each other. This ensured consistency of marking. Markers sometimes accessed the marks spreadsheet immediately after each performance but generally during moderation period.

### **Peer marking**

The peer groups were made up of 5 or 6 individuals who sat together while viewing and assessing the live performance. Prior work with the rubric and marking key meant that they were familiar with what was being assessed and how. The group was given one iPad2 to use. Groups chose to either share the responsibility of recording on the rubric by passing the iPad2 around or they selected a member to do so on their behalf. After watching the performance the peer group discussed and negotiated the marks and typed in additional comments if they felt these were needed. The peer assessing was in itself an assessed task so a record of attendance was required. This was done by asking each peer group to hold up the iPad2, use the front facing camera on it and take a photo of the group, which provided evidence as to who was there. This photo instantly embedded into the rubric alongside peer marker's names. Information that identified the peer markers was only available to the markers, however, peer marks and comments were available to markers and students being assessed.

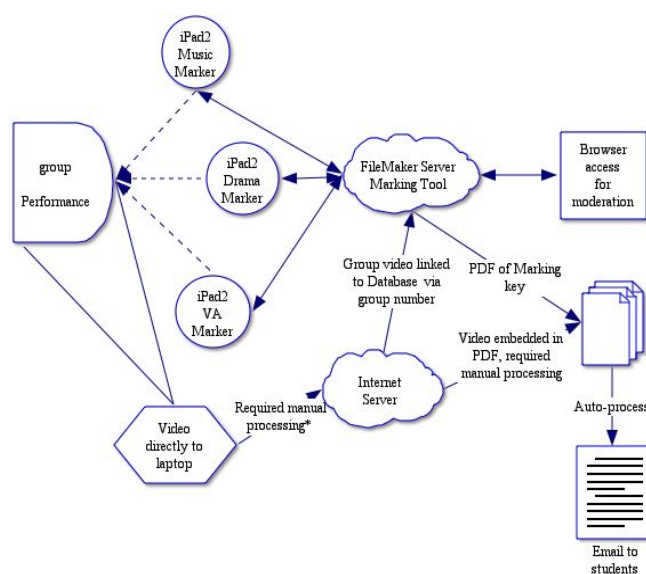
The peer markers were not at any stage able to see anyone else's assessments but the tutor-markers could instantly see all theirs. Having the tutors-markers able to see the peer assessments sometimes gave the former insights into aspects that might otherwise have been overlooked. In a few instances, it prompted a further investigation during later moderation.

### **The internet based assessment tool (Phase 2)**

The digital assessment tool is a FileMaker database customised for iPad2 and hosted on a FileMaker Server. This allowed Internet access via Instant Web Publishing (IWP) of the database and wireless access through FileMaker Go App on the iPad2. The markers could wirelessly mark the performances and moderate later using either the iPad2 or any PC with Internet access. The performances were directly recorded onto an Apple laptop via a video camera. This saved a great deal of time and meant that the videos only needed resizing for Internet access and embedding into the PDF marking key that was emailed to the students. All processes were automated except for the resizing of videos and embedding of them into the PDF document.

The digital assessment tool automatically imports the names of all students from the central university system and groups them according to their predetermined group number. All individuals within a group receive the same mark for this assessment unless there are exceptional circumstances. The digital tool instantly allocates the marks the group received to each individual within that group. At the completion of marking, the spreadsheet is downloaded and copied into university spreadsheets in the matter of minutes ensuring no human errors are made in the transfer of individual's marks. We protected the assessment information by using passwords.

The tool enabled markers to discuss the performances via a confidential markers' chat box located on the digital assessment tool. As markers were frequently in different parts of the room, they posted comments or questions which were instantly accessed and responded to by the others markers. This not only started the moderation process but recorded immediate and pertinent observations which were recalled at later stages of the moderation process. On a few occasions during performances, markers used the chat box to quickly alert each other of vital information. This meant that there was no need to talk during the performances. This chat box also became useful during subsequent moderation times and markers found they were using it to discuss and clarify aspects of some performances.



**The process of assessment using the digital assessment tool**

### **The marking keys (for tutor-markers and peer-markers)**

The marking key was a condensed version of the rubric. The full version of the rubric contained detailed descriptions of the learning at various levels for each criterion, aligned to the unit outcomes and it was negotiated with and made explicit to the students elsewhere earlier in the semester. We condensed the rubrics into marking keys to make them succinct and minimise the need to screen scroll. The marking keys were created in Microsoft Word and copied onto the iPad2. As iPad2 technology was new to many, training on how to use the digital assessment tool on the iPad2 was scheduled for students and markers. We conducted ‘dummy assessment runs’ to test the assessment tool on dress rehearsal performances. We believe that when the content of the rubric and the layout of the marking keys are negotiated and made explicit, students are more likely to make links between the learning and expected outcomes and consequently the quality of learning is improved (Brunvand, 2010).

The students were provided with two video exemplars from 2010 performances of different standards (with ethics approval and permission of students in the videos). This was done so that students in 2011 had the opportunity to identify and make a judgement about the quality of learning these performances showed. They assessed the videos using Microsoft PowerPoint incorporating Keepad ‘clicker’ technologies (LUL Technology, 2011) during one lecture time using marking keys similar to those they would be assessed on.

For example: *How well did you understand the content and purposes of the performance?*

1. Unsatisfactory;
2. Satisfactory
3. Commendable and
4. Exemplary.

The process of assessing video performances engaged students in discussion about the criteria and assessment requirements. Seeing the trends and engaging with the tutors’ commentary regarding expectations and assessment process enabled this assessment to be made explicit and educative.

The students’ peer assessment rating scale on the iPad2 required the students to consider a different set of criteria to that of the tutor-markers. Their focus was less complex and more targeted at a specific set of outcomes and coupled with the tutors’ marks, provided feedback to the performing group that was far more comprehensive. An example is shown below:

<b>Student rubric</b>			
The content and purposes were difficult to understand	The content and purposes were only somewhat understandable	The content and purposes were clear and understandable	The content and purposes were exceptionally clear and easy to understand
<b>How well did you understand the content and purpose of the performance?</b>			
Unsatisfactory	Satisfactory	Commendable	Exemplary
<b>How convincing was the performance?</b>			
Unsatisfactory	Satisfactory	Commendable	Exemplary
<b>How well did the performers maintain your focus and engagement?</b>			
Unsatisfactory	Satisfactory	Commendable	Exemplary
<b>How well did the performers use all the arts aspects of visual, musical, sound &amp; dramatic?</b>			
Unsatisfactory	Satisfactory	Commendable	Exemplary

### **Rating scale used by students to assess peers' performances in 2011**

During the two performance days, performances and peer assessments were scheduled so that every group had the opportunity to perform one week and peer assess on the other. The tutors assessed all groups on both days. Each video was compressed and embedded into the marking key within a short time. Markers used the videos to verify initial assessments they made during the live performances. They moderated online over the following few days by posting comments in the confidential chat box located on each group's marking page. They then made decisions about marks and feedback amendments.

#### **Data**

True to the nature of action research, the markers who were also the researchers engaged with ongoing reflection throughout the project cycles by discussing the research processes, in particular the type of data to be gathered and how. This was done formally and informally, both in person and via email and phone. Notes were taken at these meetings and used to inform future actions. Each of the researchers kept field notes and copies of email or verbal communication with students about this project.

#### **Student surveys**

The students were asked to anonymously complete a survey at the end of their peer assessment task. The survey asked questions about the whole assessment process; the use of exemplar videos to make the assessment explicit, the use of iPad2 for group peer marking and if they could see the application of the digital assessment tool in their own teaching practice with primary school children.

#### **Analysis**

A coded and thematic analysis of the students' surveys and markers' feedback and field notes from all the researchers was conducted. Data was organised using the themes and subthemes that emerged. Concept maps identified links between the data.

The markers, who are the researchers in this project, conducted the analysis of all the data during on campus meetings and online. As insiders to this research, we found that we were in a unique position to interpret the data with an awareness of the context and particular terminology. Our analysis was peer checked by a colleague who was not a part of this project. She was asked to specifically review our analysis and advise us about any potential bias, which she did, over a number of conversations and sessions. In addition, we presented the analysis of data to the same cohort of students in week 1 of the following semester, during a lecture. We asked for comment about its accuracy and individuals were given opportunity to comment in the lecture and/or in a written note and/or email us. The chief investigator received several emails largely confirming the analysis as being accurate and with some emails adding further information.

#### **Results**

##### **Streamlining the assessment process:**

The process of marking was streamlined because the digital assessment tool automatically saved and combined data bases from each marker. Markers could quickly view each other's marks at any time and from anywhere. They could determine what feedback each group was receiving to ensure it was



comprehensive and not repetitive between the markers. They could check the marks-spread and how the group being marked compared with other groups of their cohort for each criterion. This enabled markers to maintain consistency throughout the assessment process rather than doing this at moderation time.

The two views of each record; one for students and for markers displayed the same information but in different layouts made it easier for each to read and understand the feedback. The 'student record view' layout displayed a colour coded marking key (denoting all three arts areas - art, music and drama) and clearly shaded in to represent the level of achievement for each criterion. Placing the total mark at the bottom of the page encouraged the students to scroll down to access it. They reported that on the way down the page they initially scanned the feedback given to them, and then they read it after they watched the video of their own performance. Students could play the video of their group's performance by clicking onto it. The 'tutors view' of each record displayed their own marking key so the art marker only had the art marking key on the screen (but they could access the drama and music any time). This provided more room on the screen for comment banks and the markers' chat box. The markers reported that they found marking 'in the cloud' a highly satisfactory way of keeping consistency and it gave confidence that their judgements were accurate.

The assessment tool created a totally paperless assessment process. Records were saved onto computer files and any subsequent searching for records were simple and quick.

Initially, typing on the iPad was a little cumbersome (one tutor had access to a wireless keyboard), however, there was little need to type as the marking keys were comprehensive and markers' use of comments bank meant that generally there was little need to type. As markers became more mobile and moved around the room for vantage views, they walked into wireless dark spots which meant that they lost connection and had to re-connect and find their page. These dropouts happened several times to several markers but records were never lost as they were automatically saved.

### **Moderation via the web**

The moderation process was highly effective, as in both phase one and two of the project, online moderation meant that there was no need to arrange meetings. Online moderation engaged the markers on multiple occasions and for varying periods of time depending when it was most suitable to each. As a result, all markers felt that the moderation process was far more comprehensive than in the past. The tutor chat box provided a confidential and ongoing method of communication between markers. It saved all comments which then served to jog memory. Questions that arose *in situ* could be researched and addressed later when viewing the videos.

### **Feedback to students**

Of those students who responded to the question about the value of emailed feedback all reported that they preferred their feedback returned to them electronically. They felt that "it is an incredible use of technology" (Student correspondence, 2010) and that it is unique and easy to access on and off campus.

Most of these students reported that they engaged with their feedback multiple times. Miels (1999) emphasises the positive effects and the value that is added to the learning when students are given multiple opportunities to view their videos.

The most common comment received, referred to students seeing value in being able to watch their own performance from the audience perspective and have the marker's feedback beside the video for a quick reference. The video recordings of each performance provided visual evidence of the learning. For some students, this challenged or confirmed personal perception of how evident and explicit they had showcased their learning (Romano & Schwartz, 2005). The use of videos is common in performance-based assessment and research confirms their benefits to reflective and higher order learning (Brunvand, 2010; Ladson & Billings, 1998; Song & Catapano, 2008; Romano & Schwartz, 2005; Miels, 1999; Rich & Hannafin, 2009).

Some students reported that they shared their feedback with peers in other units as well as with family. For example,

*The rubric and video were a fantastic way to present our marks. It was good to see what we looked like from the audience's perspective as it is so different when you are up on stage, also it is nice to have something to show for your work. The family all had a good laugh too! (Student correspondence through survey, 2011)*

Several students saw further potential of this electronic feedback and planned to present it as evidence of learning in their electronic resume. In phase two of the project, the students were surveyed on whether they could see themselves using this assessment tool in their own teaching. Over 90% indicated that they saw it as useful to them in multiple of ways. Some students provided a number of creative ideas which went beyond the arts. This level of engagement with their feedback is significantly improved. Prior to this project, evidence indicated that fewer students engaged with their feedback, and that they were mostly interested in their final mark.

In the subsequent arts unit, next semester, students will be encouraged to use the feedback from their tutors and peers to inform their own future learning goals. Constructivist theory underpins the learning in this course and using assessment *for* and *as* learning is the process by which students continuously inform themselves about their own learning progress (Stiggins, 2005). A shared view by many students is summed up by one below.

*The embedded video was a very convenient and innovative way to organise the assessment information. It was the first time I had seen it used in a unit and I was quite impressed. The feedback was relevant and comprehensive and having the video itself there to view at the same time, was extremely beneficial. The provision of the video will also aid the ability of our group to assess ourselves and reflect on our performance in more detail. (Student correspondence through email, 2011)*

### **Mobility of technology**

In phase two of the project, the mobile technology allowed the markers freedom to move to vantage points around the performance room, where they had greater access to view the performance. The markers could sit among the audience members rather than as judges at a fixed place in the performance room. Some students reported that they felt nervous seeing the three markers so being able to 'blend' in with the audience may have eased some nerves.

Sitting among the audience members often seemed to invite prying eyes from those around to see what the markers were recording. Markers reported feeling as if at times they had to hide their iPad2 screen while marking.

### **Peer marking**

The students largely reported that the iPad2 was a useful tool. However, there were a number of problems with the assessment process. Firstly, the wireless connection was severed several times when students walked around with the iPad2. Secondly, some students held onto the iPad2 and did not give an opportunity for other students to use it. Thirdly, some of the text on the screen was too small for all group members to see it at the same time. Some students suggested that 2 or 3 iPads per group would have been better. A few students reported that they were very confident with using iPad2 and some felt that they needed far more training.

*I don't feel that the 5 to 10 minute introduction conducted in one tute was sufficient. As the technology becomes more familiar, I think this will provide a valuable tool to use in peer assessments.*

*I'm still getting used to all this iPad technology myself, but as we are now living in our technological age when going out into schools we are soon going to be faced with it, so, to have a glimpse of it now was very helpful. From a marking point of view is extremely quick and easy to use.*

*I'm not sure if it is because we were unfamiliar with the iPads but I actually found that they made it difficult to peer assess. Since the iPads were difficult to use, we weren't*

*able to get much feedback to our peers as was difficult enough to write and say a few words.*

*The iPad was clear and easy to follow. We just had to click the buttons and then write a comment-it was very effective in the way of collecting feedback; it just took some groups a long time to do it.*

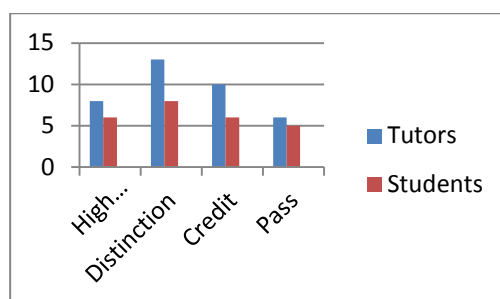
(Student correspondences through survey, 2011)

The survey response regarding receiving peer feedback embedded onto their marking key was positive. Many students reported that they appreciated their peers' feedback about their performance, particularly as they had all watched each other's performances evolve as they worked side by side throughout the semester.

In previous year's peer marking tasks, peers' were overly generous with their marks if they were not anonymously given. However, with this assessment the peers' marks were comparable to the tutor-markers. It may be that the exemplar marking and extensive discussion about giving feedback supported this. In addition, the students were also enrolled in another unit specifically teaching them about assessment and evaluation. They may have been applying what they had learnt there to this situation. This is an area which needs further study.

It is interesting to note that the final peer assessments matched the tutor-markers as follows:

(1) Table showing similarity of grades awarded for performances by tutors and peers.



### The assessment process

The assessment process included the students through participation of peer assessment, assessment of exemplars, and their feedback contributions to surveys and other forms of communication, such as email and personal conversations. A large number of students felt strongly that the process of using exemplar videos, although valuable, was somewhat compromised when they were asked to assess last year's performances on this year's criteria (which were marginally different). The singular focus of these few students on the criteria differences meant that they may have missed the benefits of exemplar marking to their own learning.

*Viewing the previous videos was a good idea, however as the criteria was different in some aspects I wasn't able to draw much inspiration from them. In a way, it helped me to see if we were marking the same as the tutors and what to expect when we mark.*

A moderate number of students felt they needed to view more performances. A few students did not know how to use key pads. Most indicated that more time to discuss the results would have been beneficial.

### Conclusion and Future Directions

The two phases of action research on assessing students' live performances provided the opportunity to examine and understand how technology could be used to improve assessment processes and practices to ultimately improve student learning. The development of a digital assessment tool has enabled a more comprehensive capture of complex learning during student performances, while being true to and often enhancing the principles that underpin good assessment. The students and markers' voices were unequivocal in stating how the use of the digital assessment tool provided for better engagement and attendance to feedback by the students.

The automation of some tasks of assessment such as collating and creating spreadsheets meant that markers could transfer and invest their time in making more considered and professional judgements about the learning. In addition, moderating with other markers online meant that moderation was convenient and therefore more comprehensive.

It is apparent from the literature that “the environment of higher education is changing rapidly” (The *Horizon Report*, 2007) and that the way in which assessment is conducted in the near future will require far more effective and streamlined approaches that are paperless and made readily accessible to and inclusive of students.

This research project asserts that digital assessment has a place in the future of assessment where its accessibility, interactivity, appeal to students and markers and its potential for a faster feedback turnaround time will potentially engage learners far more than traditional methods. In addition, with an increasing demand for online course delivery and assessment (Sprague, Maddus, Ferdig & Albion, 2007) digital assessment tools such as this have potential to improve assessment and learning.

states that (p. 3) and that “higher education is facing a growing expectation to deliver services content and media to mobile and personal devices.” (p.5).

This action research project enabled us to use technology as a tool to improve the way in which we assess our students when the capture and evidence of complex learning is required. Our students tell us that they learn better when assessment is clear and explicit, they know what evidence is being collected by the markers and they are involved with the assessment process. Modern mobile technology assisted us in involving them in a practical way.

Assessment can be a time consuming, cumbersome activity where ‘busy work’ is required to sort, collate and distribute feedback and marks to students. Using technology to streamline these tasks frees up valuable time and energy for the markers to engage with a more comprehensive marking and moderating activity. Their comments suggest that this technology-enabled process gave the markers a greater sense of satisfaction with the overall assessment process. In addition, being able to moderate anywhere and anytime meant that markers moderated on short but multiple occasions, rather than just once or twice as with face-to-face meetings. This gave markers a time to reflect and incubate ideas for more critical and comprehensive feedback. This did not seem to add time to the process. It did engage the markers more because they felt they were being more productive.

The students in our course are generally quite familiar with some technology such as accessing emailed attachments. The convenience of receiving their feedback and marks via email, particularly a week after semester’s end, meant that they did not need to travel on campus to collect their marks. This promoted a greater engagement with feedback as did the embedding of the video of their performances.

Many people are visual learners (Gault, 2005) and our experience indicates that technology can help make learning and assessment stimulating because it allows easy access to images, video clips and sounds which can illustrate or consolidate key points. Therefore, other technologies we incorporated into this study, including the use of Keepad Interactive clicker technology, afforded increased interactivity, allowing for individual participation and instant feedback on assessment exemplars in the lecture theatre. New technologies offer efficiency and flexibility that will benefit student learning into the future.

The assessment, although developed over two phases of action research, needs further development in a number of areas. Chiefly, we need to (1) reassess the amount of training students require to use iPads, (2) ensure wireless connectivity in the performance room is adequate at all times during assessment (3) increase the amount of time each group has to peer assess and (4) make it more explicit the value to learning when assessing exemplar videos The web based tool was refined in phase two and still requires further refining to reduce the time needed to resize and separate videos.

## Implications

The digital assessment tool that was developed for this project has potential for wider applications. It is easily modifiable and can be used across a wide range of educational contexts and assessment processes. It has potential to be applied with children throughout their schooling to adults in tertiary contexts.

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