

# Mobile Video Feedback: When ‘Seeing’ Informs Reflection and Learning

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## Abstract

*Providing ongoing, immediate and high quality feedback about professional learning [1] and professional standards of performance, during practicum experiences; without interrupting class learning, is a formidable task and forms part of the reason as to why preservice teacher placement spaces are difficult to find in schools. A similar challenge exists for the classroom teachers when they attempt to provide immediate, high quality feedback, on student learning outcomes, to parents. The prevalence of mobile technologies, in society, brings with it a new generation of assessment that is transforming how, when, where and why assessment occurs and the associated links to teaching and learning [2]. This paper reports on the preliminary work conducted on the impact one mobile assessment system had on the reflective practice of preservice teachers and the workloads of their supervising teachers. Preliminary data suggests that teachers, preservice teachers and schools all support the use of technology, to increase the validity and reliability of assessment, in classrooms.*

## 1. Introduction

Managing the teaching performance of preservice teachers while on practicum is a global problem faced by institutions and supervising teachers alike. This issue lead to the development of a video enabled mobile system that is capable of tracking individual performance over time while allowing the student and the supervisor to share their ideas about the performance in the teaching of all curriculum areas in the elementary school. This is not cross-disciplinary per say but it does provide us with the opportunity to apply this model for teacher performance management in a cross disciplinary context that may result in its application by administrators and school systems.

The following paper presents an approach to managing preservice teacher performance using a mobile video enabled app with an administrative website designed to allow the system to be applied to any curriculum area as well as multiple curriculum areas. The paper explores the theoretical basis for

the platform and then details the system and the research methods and its findings. This is followed by a discussion of the findings and future plans for research into the application of the system. Given the high level overview it is highly applicable to a cross-disciplinary view given the system is designed to enable the user to input assessment frameworks from any curriculum area and apply these within a classroom environment.

The current system is being investigated for its ability to be applied in schools by administrators to manage the cross disciplinary capabilities of their teachers. The built-in flexibility of the system has been identified as worthy of investigation by researchers, schools and industries where assessment frameworks require tracking over time.

## 2. Background

Assessment and reflective practice are two distinct terms that frame the study described here. Summative and formative assessment processes of preservice teachers while on practicum is the setting for this study. Findings of this study have resulted in a focus on the rich reflective practice made possible through the use of technology. In bringing these constructs together the study has aligned learning outcomes, standards of performance and deep reflective practice together as a framework for exploring the use of an e-assessment approach.

Technology is now supporting the movement towards the design of a balanced set of coherent nested assessments that can operate across levels of education [2]. There is a new generation that is changing the way assessment is occurring and how it is being linked to teaching and learning [2]. This paper reports the use of a technological system that is capable of operating across all levels of education, in multiple disciplines but focuses on its use in a professional teacher educator program and use of technology in the formative assessment process. This was taken further by the system’s ability to capture ‘knowledge-in-practice’ and provide feedback on the ‘real time’ abilities of the learners.

Practicum experiences are a central component to preservice teacher programs around the world and they bring with them inherent problems. How can

assessment of 'knowledge-in-practice', being, student responses to multifaceted, complex problems presented in by the workplace be effectively addressed? The assessment of preservice teachers against national graduate teacher standards requires the supervising teacher to gather data and provide feedback to make a summative judgment about learning. This is also true for the classroom teacher who undertakes a similar task; with respect to gathering data and then supplying feedback to their students. This assessment dynamic is present in the observational assessment processes employed for medical trainees [4] and collaborations with Paramedic science. Nursing also indicate similar assessment dynamics.

The Preservice practicum assessment process allows for the system to be used not only for preservice teachers in a school placement but also for principals to generate collaborative learning conversations with teachers and for teachers to assess students in classrooms. In the practicum setting, the mobile assessment system provides increased communication between the student, the teacher, the school and university. Currently there are inconsistencies on summative resulting in diminished reliability and validity of practicum results. This has been attributed to unstructured formative assessment processes at the school with little emphasis on what and how to assess [6]. Unfortunately, these differences may translate into the science, mathematics and other curriculum assessment processes. Classroom teachers too have similar problems, for their students, with respect to formative assessment. The recording and accessing of data to inform students about their progress is reported as a major impact on learning [7]. The possibility exists that this challenge may be addressed through the efficient use of new mobile technologies.

Creating a deeper awareness of knowledge in practice and real time application of skills and knowledge was an aspirational hope of this study. The swift infusion of technology into educational processes is opening up possibilities for new paradigms of teaching and learning [8] and the focus on reflective practice using mobile video enabled assessment practices is one example of this infusion.

The increased presence of mobile devices, such as smart phones and tablet technology in the hands of supervising teachers, classroom teachers and preservice teachers, suggests that this mobile technology may be useful in addressing these concerns. Mobile technology has been responsible for the introduction of applications to meet the demands of educators; however, pressures other than pedagogy may drive the implementation of these applications.

Preservice teacher programs in Australia are under pressure to ensure practicum experiences are

assessed against national graduate standards. At present, there is no easy solution to assessing this holistic experience [7]. The aim is to find a way that mobile technology could increase the presence of short-term feedback, in the formative process, to increase the profound impact on student achievement noted by Leahy and Wiliam [9].

The challenge to find how a supervising teacher could best provide reliable formative assessment, focusing reflection and assessment judgments on the learning outcomes and standards of their preservice teacher led to the creation of the Preservice Teacher Tracker (PTT) [10] and its associated application with a mobile device. Triangulation of learning outcomes achieved by the student, Professional Standards as decided by the external accrediting body and reflection at a personal level by the student and teacher has highlighted the value of 'knowledge-in-practice and the ability to 'see' how skills and knowledge manifest in real time.

Knowledge-in-practice refers to the display of knowledge by a student during their practice in a real world situation such as a workplace. The work place presents real, complex problems where students are required to call on their knowledge and use it in a workplace context. This provides a real time demonstration of the skills or knowledge as opposed to a rehearsed or low-pressure demonstration without authentic consequences or pressures.

Once this demonstration is captured, what happens next? A cyclic model of reflection has been proposed in unpublished work [11] reports a cyclical model that flows from demonstrating, showing, understanding, knowing, seeing and then back to demonstration. The demonstration by the students against a particular standard of behavior or to demonstrate a particular skill is recorded.

When this experience is then shown by the teacher to a student the sharing and resulting conversation can explore even more of what the student understands and knows about their knowledge of practice. Once a student is engaged in this conversation it is suggested that the learning switches to what is known by the student and what can be known. Hence the gap-in-knowledge can be identified and acted upon. This knowing is brought about by the availability of the video and allows the student to begin to 'see' their professional knowledge grow.

The cycle described is firmly located in the assessment process, specifically the formative assessment process and is supported by the McCann and Radford [12] collaborative framework for the enhancement of teaching and learning. The involvement of video may increase the accuracy of the formative feedback offered in the collaborative approach to workplace practicum. This increase in accuracy increases the students' ability to understand their gap in knowledge as displayed in their practice

and consequently they are able to reduce their 'gap-in-knowledge' as the practicum progresses.

The report that follows briefly outlines the mobile application used in the trial, a description of the methods and methodology used and finally, the research questions that were posed. The current themes are identified and discussed, along with outlining possible future directions for the study; in terms of the initial hypothesis proposed by the case study.

Central to this discussion is the impact of mobile applications on the formative and summative process of assessment, as well as the reflective practices associated with preservice teacher feedback and the feedback provided to parents about their student's learning. Formative assessment receives little attention despite its crucial role in promoting learning [13] and this report aims to add to the literature on formative online and mobile assessment in higher education and classroom settings.

Cochran-Smith and Lytle [14] propose that teachers must possess and operationalise knowledge on two planes: knowledge for practice (having the knowledge) and knowledge in practice (applying the knowledge in the practice of teaching). Drawing upon each of these typologies of knowledge we can identify three ways of knowing something: 'knowing what', 'knowing why' and 'knowing how'.

Each of these ways of knowing manifest in the learning programs of preservice teachers. One of the issues is that pre service teachers need tend to plough through the content presented in their course work and are then charged with the task of connecting this content or the 'what' with knowing how and knowing why. In order to make these connections students attend practicum experiences and are supervised by teachers who rarely have knowledge of what the preservice teacher has been taught. The teachers only indication of what has been taught is delivered in terms of aspects of teaching they are to assess. It is then left to the teacher to see if the student knows 'what' to teach, 'how' to teach and 'why'. During the process of the teacher assessing these aspects of the pre service teacher they are often distracted from 'seeing' what is happening in their classroom.

Hence, 'seeing' is very important and has two dimensions relevant to this study. Firstly, the capacity for a teacher to see what is occurring in the classroom and secondly, the teachers capacity to see how, why and what the preservice teacher knows. If a person can see their behaviour they are effectively seeing themselves operationalise knowledge they have attained. This operationalising goes back to the Cochran-Smith and Lytle [14] work describing knowledge for and in practice. This project extends this notion of what is seen by the teacher and how this can support the assessment phase of the placement when mobile technologies with video capture capabilities are harnessed. Making the scene

actionable involves turning that something seen into an action that can improve learning outcomes. Can video capture enhance the teachers capacity to see **what** is happening in front of them, extrapolate that knowledge into pockets of information that allows preservice teachers to plan for improvements, **how** to change the pathway to a student's learning by seeing **why** what they are doing is not working. This flipped three-dimensional knowledge construct is the focus of the study.

### 3. The Mobile tool

The tool described by Willis [10] facilitated the collection of teacher observations of preservice teachers in the form of text, video and images. Text was in the form of comments, goals set for the student, suggested strategies and time lines about specific criterion. Each entry is housed in a secure server and can be retrieved on mobile devices by the preservice teacher and the supervising teacher. This information is used to reflect on feedback, discuss progress, or inform a summative judgment for the criteria. This application provides an evidenced based judgment on the preservice teacher's performance against national standards.

Being of a mobile design it enables the user to benefit from the freedom to enter data at any time and place, increases the access to feedback over time, enables specific one-on-one feedback; focusing on teacher standards, and streamlines the retrieval of data for summative decision making. Teachers, students and academics from a small regional university in Queensland, Australia in a collaborative approach to design, conceived this system.

Initial trials of the system used a purpose built iOS system design for use on an iPhone 3. This system was integrated with a web system that allowed teachers to collect and record data at any location. Video and images were only able to be collected via the iOS system. Funding restrictions has hindered the ongoing development of the iOS system. Subsequent trials used the web-based interface on tablets to gather and report data without the video capture system being enabled. Future trials will require funding if the video and image capture is to be recoded into the iOS for the current generation of smart phones and tablets.

In 2014 the system was re-written for commercialisation and has become available in tablet form for multiple platforms. The re-written system enhanced the supervising teachers ability to capture video on the device and also allowed for the assignment of this video to multiple competencies within the universities assessment framework. It now has the ability for students to seek peer assessments of frameworks that they are being assessed against and also allows the student to upload documentary evidence to support their demonstrations of

knowledge in practice. Each of these documents is then made available to the supervisor for comment and reassigning to competencies within the university assessment framework.

Adonis [15] describes a process of ‘applying knowledge in the practice of teaching’. This study has taken this a step further by focusing on knowledge-in-practice through the use of the iOS system. This study sought to explore the construction of new knowledge by the pre-service teacher through video data capture. The video collection process may have a deeper application, in that it directs the teacher’s attention to what is happening in front of them in real-time. Consequently, the terms knowing **what**, knowing **how** and knowing **why**, are all interlinked with the notion of the definition knowledge-in-practice. This is further enhanced by the metacognitive awareness of teaching behaviour [16] discussed by Darling-Hammond.

#### 4. Research Questions

The framework of Adoniou sets the background for the research questions of this study. The framework provides a link between the experience of practicum for a pre service teacher and the infusion of video capable technologies.

Could the embedding of mobile technologies, in formative assessment processes, enhance the learning of preservice teachers on placement and K-12 students in a classroom environment? This question was structured around current knowledge on mobile technology in education, formative assessment and mobile delivery and assessment in classrooms. It also is positioned within teacher knowledge of what, how and why and the interconnected nature of these domains as experienced by the teacher and the pre service teacher. A subsequent enquiry into this question led to five sub-questions:

1. Does the capability of mobile technologies improve the feedback process to preservice teachers and students in a classroom environment?
2. Does the quality of feedback provided via mobile collection tools improve the learning for students?
3. Does the mobility of data collection for formative assessment intentions improve the assessment process of work place learning practice in teacher education and curriculum outcomes in school classrooms?
4. Does mobile access to formative assessment tools improve the mentoring experience for the supervisors of the preservice teachers and teachers in their efforts to provide ongoing formative assessment to students?
5. Does mobile formative assessment impact on learning; when mobile devices are used to

collect and report formative judgments about national curriculum standards and nationally imposed standards throughout the learning process?

These questions are ambitious for a single study and will be comprehensively reported upon in the doctoral thesis of the author. This paper reports the preliminary work done prior to the commercialisation when the system was presented in iOS and web format.

#### 5. Methods and methodology

A pragmatist approach to case study is the central methodology used in this study. The use of a mobile application was implemented in a small-scale trial with seven users, of the mobile device, and nine users of the web system. The trial was one of a multi case design, which can be viewed as more robust [17]. The case study explored two key areas; a phenomenon within the classroom assessment process and the policy implications of the use of mobile devices.

The methods employed in this multi case design included pattern matching, time series analysis and cross case synthesis. These methods were used in association with pre and post surveying of the participants (students and teachers and administration users) and an analysis of the analytics of the system during the case study period. Each of these three methods was triangulated using the pattern matching and time series analysis processes. As a result of this triangulation, a cross case synthesis occurred when multiple cases had been completed.

Before undertaking these methods the author engaged in theory development. This is an important aspect of case study [18]. After considering the current literature the author theorized that mobile technology could be used to provide formative support, in the classroom learning of standards, and possibly inform on improved learning outcomes for students. This includes the belief that the collection and reporting of data collected via a mobile device can enhance the teacher’s judgment and access to this judgment. This project has currently undertaken one complete case study and is developing further cases in various classroom contexts to examine classroom assessment, via mobile devices. These contexts include teacher supervision of preservice teachers; while on placement, and teacher formative assessment data collection of student performance in spelling.

#### 6. Findings from the trials

The what, why and how of teaching in the classroom is explored in this study through the use of mobile technologies to improve feedback. The

findings of the first case study, reported in Willis [10] and Dann and Allen [19], highlight two central ideas. Firstly, that students and teachers are capable of using the system in the classroom environment. Secondly, the use of the system provides a view of the students' reflection that seems to be contrary to the classroom based assertion of Wiliam [6]. Wiliam asserts that short feedback cycles are the preferred formative assessment cycle. Wiliam also acknowledges that formative feedback is highly influential in the learning process. The feedback capability of the system was shown to relate directly to the pre service teachers' knowledge in practice.

The findings have also lead to increased 'knowledge in practice' feedback based on knowledge of practice by a supervising teacher. The use of video supported the students' ability to identify their knowledge gap and by viewing their practice in real time they were able to begin to close their gap in knowledge during the practicum period.

The need for constant feedback with clear expectations is widely accepted and is supported by McCann and Radford's [12] collaborative model mentoring. The feedback needs to be supportive of the relationship and by technology and other aspects of the classroom environment. The findings of this study show that feedback using a mobile device was constantly provided for preservice teaching. The study also found that video was a tool that allowed students and teacher to interpret the vision in their own ways. The resulting discussion, when focused on specific learning goals, was productive for the student.

Analytics of the first case study supports the interview data showing that supervising teachers collected the majority of their data in the mornings before 11am and preservice teachers downloaded this feedback data after 9pm at night. This correlated with the preservice teacher interviews, and survey data, which showed preservice teachers preferred to reflect on their progress at a time when they could fully focus on what they needed to do to in order to improve on their performance. The analytic data collected to date indicates that the times, and time allocated to reflection on feedback, is becoming a critical element in the learning process for these preservice teachers.

Further to this, both supervising and preservice teachers reported on the ease of use of the mobile device and the increased focus on the learning criteria of the practicum. Increased familiarity with the criteria increased the breadth of feedback and the specificity of the comments and feedback. One of the findings was that teachers did not want copious criteria upon which to record and assess their practicum student.

## 7. Thematic discussion

A thematic coding of interviews, from teachers clustered into eight themes, was undertaken. These themes included, benefits, frequency of use, video recording, technical issues, feedback, comparison between paper and electronic, suggested changes.

The research questions focused attention on the feedback and the impact mobile technology had on feedback. The themes from the supervising teachers, which related directly to this focus, were video recording, technical issues, frequency and benefits of this particular system. Interestingly the supervising teachers' comments, on frequency, differed from the preservice teachers' perceptions of the system. The supervising teachers felt that verbal feedback was enough; while the preservice teachers sought more definitive feedback to act on.

The simple use of stars as an indicator was well received by students but was problematic for teachers and academics. As there was little definition provided for a single star result as apposed to a four star result. Students reported that they used these star ratings as a measure of improvement only and not as an indication of passing or failing.

The supervising teachers suggested that the electronic system did stream line the mentor formative assessment process and said that they felt it was more beneficial to the preservice teachers than themselves. This key comment related to the research question, in that, the system focused the supervising teachers' attention on the competencies. This comment related directly to the reliability and validity of the summative assessment.

One of the key themes that emerged was that the trail required the teacher to complete the formative assessment on the mobile system and then complete a paper-based system to report formally to the university. All teachers reported that they felt the electronic process was the 'way of the future' but they wanted one system capable of formative and summative communication to the student and the university.

Supervising teachers expressed the desire to use more video for the preservice teacher to view but found that their engagement, with the learning process, precluded this ability; unless it was planned for and they consciously withdrew from the teaching and learning process within the class.

Ethically, the use of video was difficult to manage. Considerations and processes were put in place to ensure the confidentiality of the video, the storage location and security was highly scrutinized and the password security of the data was maintained throughout the trial. However, the preservice teachers felt that the use of video was system's greatest advantage. This was because the preservice teachers believed they could 'see' engagement and as a result, this allowed them to correct behaviors

they noted in the video. This area of the study requires further development.

How did the student assess their video feedback? The students viewed their video at night and then referred to written notes provided by the supervising teacher. This combination provided direction for future learning. The study did not seek to quantify the process students used for planning future improvements but it did gain an understanding of the value students placed on the video in their learning. Initially, the preservice teachers wanted some control over the video. They were uncomfortable at first; however, they valued the vision as a learning aide.

Technically the video was hard to watch, due to the limited sound quality from the mobile device. Video analysis of all videos demonstrated this; when whole class video was being recorded and less when videoing small groups. Control over video capture was also a technical issue identified by supervising teachers and preservice teachers; supervising teachers wanted to pause video capture. Incidental video was not effective, as the supervising teacher had to find the criteria that referred to the video before beginning the video. Changes to the current process of videoing have been altered in the commercialized version to allow supervising teachers to video, and then assign the video to an appropriate competency with comments.

The ability of preservice teachers to demonstrate what, how and why during a practicum experience is vitally important. Yet the demonstration can now be shown back to the student, explored through a collaborative conversation that results in a student articulating some level of understanding that allows them to know what they need to do to improve their performance.

## 8. New trials

This case study forms part of an ongoing doctoral study that is investigating the impact of formative assessment of student work on externally imposed standards when collected on a mobile device. This doctoral work will focus on three case studies. The first case relates to the Higher Education sector, with further case studies sought in the K-12 and vocational areas. The initial case study was a small-scale trial and a further collaborative study, in the Higher Education sector, is now envisaged to broaden the data set.

Two other cases are being sought to provide a collection of data that could inform theory and policy. The overall structure of the study relates to using multiple case studies, with embedded units of analysis. Using the lessons learnt from a systemic review of direct observation tools, used to assess medical trainees in clinical skills [3], can guide further case studies. According to Kogan et al [3], direct observation of medical trainees occurs

infrequently and inadequately and the author contends that this holds true for teacher education making the investigation into the use of technology to record observations in formative assessment. It is clear, that the use of multi institutional studies will help in the generalisability [17] of findings. To ensure quality, the research needs to be characterised by the assessment intervention process, evidence for reliability and validity across institutions and the pedagogical implications of the intervention.

Cases will be conducted in classrooms and will have 5 common elements:

1. A mobile device will be used to collect data
2. Data will be collected in the formative phase of the assessment
3. Formative data will relate directly nationally driven standards
4. Data will include planning for improvement and tracking of data collected
5. They data must be available tot all the users of the system

The analysis of each case study will have embedded units of analysis:

1. Higher education – professional standards focus
2. K-12 education – national or external core standards for achievement
3. Involvement of third party supporters of learning – Parents for younger students.
4. Performance measures for professional performance as defined by a profession
5. Impact mobile data collection in the formative process has on pedagogically driven decisions in classroom.

The Higher Education applications that have these characteristics include teacher supervision of preservice teachers on practicum, preservice teacher students providing feedback to a lecturer and tutors about their delivery of national graduate teacher standards, providing feedback to preservice teachers who complete presentations to tutorial groups; as part of their assessment commitments.

School sites have their own formative assessment requirements but the underlying principle remains the same; Can mobile devices assist the collection of data and improve the learning outcomes without imposing a negative impact on the learning environment?

The planning of the first school-based case has shown that the reflective practice component of the system, as used in higher education, is replaced by the opportunity for parents and caregivers to have access to the students' progress. This is seen by schools as an advantage to the learning and brings the parents /caregivers into the assessment process. It may provide parents with a clear understanding of the students' ongoing progress.

## 9. Limitations

Tracking formative feedback in Higher Education and school, by using mobile technologies, has been shown to be possible on a small scale. The limitations of the first case study are numerous. Firstly, the study was carried out with a small number of participants. Secondly, the survey data response rate was limited and the criteria used by the supervising teachers were tenuously linked to the national graduate teacher standards. Finally, the survey tools, interviews and analytics also failed to focus on the impact the mobile technology had on the pedagogical decision of the teachers.

## 10. Conclusions

The role of mobile devices in the social and professional lives of teachers and students across the globe has seen their presence increase in education and now specifically the formative and summative assessment process in classrooms. The effectiveness of these devices, and the systems that teachers interact with, will have an impact on learning. Mobile devices can have an impact on the effectiveness of the assessment process and also, on the effectiveness of the teachers action in the learning environment.

The latter of these is of interest to this study. Will the introduction of mobile devices have a positive net impact on learning in the classroom? Will the advantages of mobile collection in the formative process outweigh the impact the system has on the general learning in the classroom? In terms of Higher Education do mobile devices enhance the assessment process enough to increase the effectiveness of the teacher training program; without having a substantial impact on the learning of the class? What would be regarded as a substantial impact on class learning?

This report has briefly outlined the mobile tool used in a case study doctoral program and has described the methods, methodology and the research questions posed. Themes that emerged from the triangulation of the data were discussed and future directions for the study were proposed in terms of the initial hypothesis proposed by the case study approach. Formative and summative process of assessment, including the reflective practices of the preservice teacher and the feedback on learning to both students and parents, in schools, were also addressed.

The increasing prevalence of mobile devices and the demands that they may bring make this examination an important part of the evolving research into the use of technology in educational settings.

With mobile video enabled technology becoming increasingly available to educators and learners will the cross-disciplinary assessment capability increase

or hinder learning outcomes in classrooms? It is the hope of this author that pedagogy can drive the design and implementation of technologies and that it is the learners who receives the benefits rather than coders and technology companies.

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