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# Become your own personal videographer: Capture, reflect and analyse classroom interactions with self-tracking video technology using mobile devices and 3G cameras

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# BECOME YOUR OWN PERSONAL VIDEOGRAPHER:

# CAPTURE, REFLECT AND ANALYSE CLASSROOM INTERACTIONS WITH SELF-TRACKING VIDEO TECHNOLOGY USING MOBILE DEVICES AND 3G CAMERAS

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Abstract

*Professional accountability and the provision of evidence of performance, aligned to industry standards are challenges faced by all professionals. This research investigates how a group of educators have used technology in an innovative way for professional learning. The goals of the TIPS-2 Professional Growth Project (TIPS-2) were to investigate cost effective and constructive ways to use video and a range of innovative technologies to monitor teachers` performance aligned to standards while supporting self-reflection and collegial learning.*

*Research was undertaken with a group of K-10 teachers as they used self-tracking video technologies, mobile phones, touch tablet devices and 3G cameras to document and reflect on their classroom practice. A community of practice model was used for teacher professional learning. Specialised software addressed the challenges of how to process and make meaning of complex, multi-layered, dynamic actions and reactions in time and space captured in classroom videos.*

*The findings include practical examples of cost effective tools and sustainable practices to monitor professional practice, promote personal growth and align performance to professional standards and indicators. Reflective protocols around the use of classroom video for sharing classroom practices in a community of practice model were developed.*

## Introduction

There is a growing body of research linking student learning outcomes to the quality of the teaching (Hattie,2003; Petras, Jamil,& Mohamed,2012). The overarching aim of this research was to investigate cost effective and sustainable ways for teachers to use technology to improve the quality of their teaching by gathering video evidence of their professional practice in the classroom as aligned to national standards. A community of practice model was used to support teachers to review and reflect on their teaching. In the analysis phase sophisticated video and audio capture of teaching and learning behaviour, combined with computer-based analysis, was utilised to investigate the relationships between teacher behaviour, student engagement in learning and learning outcomes for improved teacher effectiveness.

The TIPS-2 Professional Growth Project (TIPS-2) is a pilot study investigating how teachers use new video technologies for classroom observations to gather multi-modal evidence of their teaching over a period of time. This evidence was used for professional accountability and to improve the quality of their teaching. This paper shares project findings concerning the use of self-tracking devices for personal video capture, ways to use technology to support the integration of the Australian Professional Standards for Teachers into classroom practices and a selection of online professional learning resources developed for the teachers.

## Literature review

According to Darling-Hammond (2004) teacher quality has a significant impact on students' achievement, in some instances overcoming socio-economic and language background factors. The Bradley (2008) and Gonski (2011) reviews foregrounded the importance of high quality teaching to lift levels of student achievements in schools. Teachers and school leaders are expected to provide tangible evidence that they are delivering high quality educational experiences in their classrooms. One way to determine if quality teaching is occurring is through teacher observation, however it is time consuming and expensive to have a colleague in the classroom observing teaching. There are also limitations to the objectivity of feedback delivered by a peer. "Using evidence that represents teachers' practices over time is a much more accurate representation of instructional expertise than relying on one or two observations" (Pickering,2012,p19).

Most teaching occurs behind closed doors and many teachers have not seen themselves teaching and few have observed their colleagues in action. The introduction of national professional standards for teachers (AITSL,2011) and a common curriculum means that all teachers can benefit from observing and reflecting on their own and other teachers' practices. The challenge addressed in this research is how to use ICT to facilitate teachers this observation of classroom practices and to develop supportive protocols to review and reflect on teaching in an unobtrusive and sustainable fashion.

## What constitutes quality teaching?

Before beginning to observe and reflect on classroom teaching, teachers and school leadership must address this important question. "What constitutes quality teaching?" There are many opinions on what constitutes quality in teaching. Where teachers need to provide evidence that they are delivering "quality" teaching there needs to be a clear understanding of what determines that "quality" and a defined set of standards they need to uphold. The use of standards can help to distinguish teaching as a profession, in that teachers "are expected to acquire specialized knowledge, meet standards for entry, and uphold professional standards of practice in their work "(Darling-Hammond, 2004, p. 1050). In an attempt to articulate what constitutes quality teaching, the Australian Institute for Teaching and School Leadership (AITSL) was commissioned by the Australian Government to develop a set of professional standards for Australian teachers. These standards aim to describe the professional behaviour, skills and practices required from teachers in Australian Schools (AITSL,2011). These standards are referred to as the Australian Professional Standards for Teachers (APST). In this research the APST are used for goal setting and classroom observations and as a framework for teacher reflection facilitated by the new video technology.

## Professional Standards for Australian teachers

The APST provide a common framework and terminology for professional discussions about quality teaching. They have now been adopted and adapted by the education authorities in each state to make them relevant for all Australian teachers. For example, in Western Australia the Teacher Registration Board (TRBWA) amended the APST to include early childhood teachers working in childcare settings. The APST contain seven standards to be used over four levels of a teacher`s career from a graduate level moving to proficient, highly accomplished and lead teacher (AITSL,2011). Initial teacher education curriculum in Australia, are under revision to include the competencies required in the graduate level of the APST and evidence of this alignment with the standards is now required for accreditation of teacher education courses (MCEECDYA, 2011). The higher levels contained in the APST, namely proficient, highly accomplished and lead teacher standards are used to guide and support the professional development of teachers throughout their career. They are used as criteria in job applications, promotions and performance management.

> "*Effective teachers are crucial for enhancing student engagement and achievement, and play a vital role in establishing productive and supportive school environments. The Standards will spark professional dialogue among teachers and principals regarding what is expected of effective teachers.*"(Ms Sheree Vertigan, President, Australian Secondary Principals Association)

A number of countries including the England, New Zealand and the USA have introduced professional standards for teachers. It is interesting to note that Finland that has a highly acclaimed education system has not introduced standards for teachers. There are a wide range of opinions on the policies and governance of professional standards. Tuinamuana (2011) supports the commonsense view of the use of standards in Australian schools that "having 'standards' will be positive development. Who would not want schools and universities to uphold professional teaching standards of some sort? "(p. 74). There are others, who view the introduction of standards with suspicion seeing them as a "mechanism to control teachers and the teaching profession" (Sachs, 2003, p.177).

Although it is beyond the scope of this paper to discuss the perceived effectiveness and the political implications of The APST, it is relevant to discuss factors surrounding the use of the APST. Problems can arise in how teachers view the APST. There is evidence in the literature that teachers' need to take ownership of the standards by actively engaging with them critically and evaluating them before applying them to their own teaching context. The researchers support the perspective of Petra, Jamil et al. (2012) who viewed teachers as change agents "In the context of reforms aiming at the improvement of educational systems, it has been widely acknowledged that teachers are to serve as essential agents of improving the educational system, rather than being one of the numerous 'variables' that need to be changed."(p 52). This notion of teachers as change agents taking control of setting goals and gathering evidence of their achievement was central to the design of the project. According to Sachs (2003) teachers need to engage with the standards on a personal level and not feel that the standards are being imposed on them in a controlling fashion. This approach was adopted in the design of the intervention.

When new practices are introduced there is concern about slippage, which constitutes a lowering of standards or desired expectations. This can occur when theoretical constructs are translated into action. In regard to the APST an opportunity for slippage is when teachers interpret the standards and apply them to their own practices. Currently there is little evidence of how an APST standard or a sub-standard translates into classroom practice. Teachers have to interpret the APST and provide evidence that their own professional practice aligns and demonstrates mastery of the APST. The findings of this research will support all teachers and school leadership as they engage with the APST.

## The use of technology for the observation of teaching

One of the attributes of being an effective teacher is the ability to set and monitor personal goals and to learn through connection and self-reflection (Baecher and Kung, 2011). This project directly addresses teachers' needs reflect on their practice and to provide a range of tangible evidence indicating how their professional practice shows mastery of the APST. One focus of this research project was to investigate how the affordances of technology can be utilized to support teachers in their professional learning and professional accountability. Research indicates that the use of video to capture professional behaviours, combined with peer review and self- reflection can be an effective way to develop professional practice (Anderson and Nielsen,2011; Clarke,1997; Lane and Fetherston,2008).

The APST has three aspects namely professional knowledge, professional practice and professional engagement. This project focuses on professional practice because teachers have indicated it is a challenge to get useful feedback to improve their professional practice. Teachers' professional practice is dynamically changing and evolving as they engage in complex professional interactions that take place among multiple characters in space and time. Because there are so many factors and variables these behaviours are very difficult to capture in one mode using only written descriptors. The technologies used in this research facilitate the capture and the analysis of complex behaviours that are influenced by a wide range of factors including space, proximity, time, language, gesture and social interactions.

However the researchers acknowledge that there are a number of limitations to using video to record teachers' practices. For example Lane (2012) found that many teachers have never seen themselves in action and find the process of being recorded on video confronting and overwhelming. There are ethical considerations when using video in schools, for example signed consent needs to be obtained

from all participants and from the parents and guardians of all minors. The needs of all participants have to be accommodated in the design of the intervention. In some instances where video has been used in classrooms it can be a disruptive influence because having additional people in the classroom to record the video can impact on student and teacher behaviour. In one study a research assistant was required to focus a camera on the teacher because the teacher is constantly moving in addition the researcher was present in the classroom monitoring the other equipment (Clarke, 1997). The TIPS-2 research investigates how a new technology can be used to address the issue of the disruptive impact of the technology intervention.

According to Baecher and Kung (2011) “Inexperienced teachers "see" less of the complexity in classroom events than do experienced teachers, and those who have a scaffold with which to interpret their videos of teaching are able to go further in their interpretations”. (p.16). According to Baecher and Kung (2011) teachers need training to select a point of focus by knowing who, what and when to record. In the same way support is needed to view video in a critical and reflective way because a short clip of video contains so many elements on a number of levels (Baecher and Kung,2011). The process of viewing and video clips of classroom teaching and analyzing the clips using a framework and having a shared vocabulary can help teachers to critique video more efficiently (Newhouse, Lane, & Brown, 2007). The dual processes of reflecting individually and in groups “on action” and “in action” can lead to higher levels of metacognition (Lane,2012).

### The use of TPACK in learning design

The teachers in the project requested support with the integration of ICT in the design of learning activities. A number of the teachers worked from a traditional base and designed a pencil and paper task and then added technology as an after thought, which did not add value to the activity. Thus the Technological, pedagogical and content knowledge (TPACK) framework was introduced to guide teachers as they designed their classroom activities in this project.

The TPACK Framework, was developed by Koehler and Mishra (2008) to conceptualise the skills needed by teachers in 21st century classrooms. TPACK represents the integration of three bodies of understanding: Technological Knowledge (TK) an understanding of how to use technology for learning; Pedagogical Knowledge (PK) the knowledge and skills of which instructional strategies to use in the classroom; and Content Knowledge (CK) the knowledge of the content and curriculum area (Keohler & Mishra,2008).

## Methodology

### The aims of the research

The research aimed to investigate cost effective and sustainable ways for teachers to use technology to gather evidence of their performance in the classroom. The evidence would be used for professional accountability, collegial sharing and to improve the quality of teaching.

#### Overarching research question

How can self-tracking video technology and professional learning networks be used to promote changes in teachers practice when using mobile touch tablet devices to deliver the National Curriculum and comply with the Australian Professional Standards for Teachers?

#### Setting the context for the research

The research was undertaken by a researcher from the Institute of Educational Research at XXX University, in collaboration with four Department of Education and Training (DET) schools in Western Australia.

#### The sample

The research took place in four primary schools. The schools were selected to represent a wide range

of socio- economic profiles. Schools that wanted to increase the use of information and communications technology (ICT) in their teaching and who had an interest in using touch enabled tablet devices were invited to participate.

School A was a primary school that catered for students from a low social economic background with a high percentage of learners from indigenous backgrounds. School B was a primary school from a middle class environment with students coming from migrant families who had high aspirations for their children. Thirteen different home languages were spoken in School C. School D was high achieving primary school, that a new principal and deputy with clear aims to increase the integration of ICT within the school. All of the schools had strategic aims to increase the use of ICT used in teaching in the school.

## Research Plan and Timetable

The research took place over eighteen months from the planning phase to the end of the data collection phase. The data analysis phase took an additional six months.

**Phase 1 Planning -December 2012- March 2013**

This project required a lot of pre-planning and preparation. There were a number of factors that made the planning of this project difficult. The project was situated in Department of Education and Training Schools (DET) this required permission from the DET research office. The use of video in schools can be problematic so very careful protocols had to be followed to gain departmental permission. The wording on the information letters and had to be specific to make it clearly understandable for each year level. This process took over four months and delayed the start of the project. Ethics approval needed to be obtained from the university to do research involving human participants. In the months preceding the implementation of the project in the schools all survey questions, the data collecting instruments, the information letters and all permission letters were developed.

Once ethical approval was obtained the researcher applied to school principals for permission to undertake research in their school. The researcher visited the participating schools and presented to the staff about the project. Teachers were invited to participate. Two volunteers were selected from each school. The selection of teachers was done in collaboration with the school principal.

**Phase 2 Implementation- April 2013- October 2013**

Two pre-project professional learning network meetings were held with the participants these meeting took place at the university after school hours. The principals negotiated this time with the teachers this was part of the schools in-kind contribution to the project. The participants completed a pre-intervention online survey based on the first three standards of the APST focusing on professional practice. The participants set goals for the first month of the project based on one of the sub-standards from standards 1-3 of the APST. Participants worked together in their school teams to plan how they would use the technology in their literacy classes. The teachers indicated that they needed professional learning to assist them to use technology in their teaching. This was provided in the network meetings and a project blog with a range of online resources was provided for the teachers to use. This was supplemented by an Edmodo site containing professional learning resources, which the teachers could access online when it was needed.

The participants met each month in the professional learning network to share video clips, reflect on progress and plan how they were going to use the technology in their classes over the next two weeks. Participants were encouraged to meet weekly in their school teams to share their learning and support one another. Some of the schools used these staff members to become in school experts to lead change across the school.

**Phase 3- Post intervention data collection and data analysis- October 2013-March 2014**

The participants completed the post intervention online survey. A post-intervention professional learning network meeting was held with the participants. The researcher conducted individual post project interviews with the participants to gather data on the effectiveness of the technology and recommendations for further learning and the growth of the professional learning network.

## The research plan

Two or more teachers were recruited from each school. The teachers were volunteers who wanted to develop evidence of their classroom practices aligned with the APST and to improve their skills to use ICT as a tool for teaching and professional development. The teachers set their own goals using the APST. The teachers distributed the project information and permission letters and signed consent was obtained from the parents and guardians of each child in every class in the study. This needed careful monitoring and follow up from the researchers before the project could proceed.

### Project Network Meetings

This project used a community of practice model to allow the teachers to take ownership of the project and lead the learning. A goal setting exercise led the teachers to set their own goals for professional growth that they could achieve through implementing a learning activity in their classroom. The teachers shared their goals and their proposed outcomes with the group.

To support the teachers taking control of their professional growth the teachers were given the equipment and the skills to "become their own personal videographer". They learnt how to capture, reflect and analyse their own classroom interactions with self-tracking video technology using mobile devices and 3G cameras. All of the teachers were provided with a robotic self-tracking device called a Swivl and a wifi enabled touch screen device with an inbuilt camera to film their classroom practice. In this project a range of devices were used namely, iPad-2, iPad Mini, iPod touch and iphones. This allowed the teachers full control of the videography process. Using the equipment provided they could video in their classroom at anytime. The device was operated remotely either from an application on a mobile phone or from a clicker worn on a lanyard by the teacher. The lanyard also contained a movement sensor, which activated the video tracker and followed the movements of the teacher over an area of ten metres. Although this sounds complex all of the teachers in the project managed to successfully install the devices and capture high quality video in their classes.

A community of practice approach was used in the network meetings, as school leadership, teachers and academic researchers, used the professional networks to engage, reflect about current practice and generate recommendations for future growth. The TPACK framework was discussed and the teachers worked with colleagues to plan a learning experience for their class that integrated ICT. The classroom activity needed to provide evidence that teachers were achieving a self-selected sub-standard of the APST. This project was not a top-down process the teachers led the sessions and initiated the sharing sessions.

The network meetings became successful sharing and observation sessions the participants shared their experiences and the short video clips (3-5 minutes) to demonstrate how they were meeting their goals and demonstrating their competency in terms of one of the National Professional Standards. The participants developed a protocol for viewing classroom video and giving supportive feedback.

## Research questions

This research is important because it addresses the following four questions, namely:

1.How can school leaders and fellow teachers know what is happening behind the closed doors of classrooms?

2.How can teachers monitor and reflect on the quality of their own classroom teaching?

3.How can teachers provide tangible evidence of their professional effectiveness in the classroom that goes beyond test scores?

4.How can teachers use technology to analyse and reflect on classroom interactions?

### Subsidiary research questions

Three subsidiary research questions were used to guide the study.

1.What were the teachers` levels of confidence to meet the APST before the intervention.

2.What levels of help and support did the teachers need to meet the APST?

3. What were the practices of teachers who indicate they are confidently meeting the APST?

## Data Collection and analysis

The teacher completed a pre and post intervention online survey. The surveys collected qualitative and quantitative data on the teachers' levels of confidence related to the first three standards in the proficient level of the APST. A five point likert scale with one indicating "not yet competent and five indicating an "expert" was used for teachers to indicate their perceived level of confidence to deliver the outcomes described in the APST. The online survey tool collated the data and provided an initial analysis by summarizing the results and generating tables. The data was then exported as a CSV file to EPSS software for further analysis. The qualitative data was analysed using Nvivo and coded to generate themes.

In the pre-intervention survey the majority of responses were in the bottom end of the scale indicating that the teachers felt they were not yet competent to meet the standards at a proficient level of the APST. This was interesting because there were some highly experienced teachers in the group including two deputy principals. There were three new graduates in the group two of which rated themselves as a 1 not yet competent and one first year teacher self rated as a 4 across most standards which was one level below and expert. This teacher was the most confident in terms of learning about new technologies. The researchers are mindful of the limitations of self-perceptions of skills.

An additional a qualitative field was included for each standard. In this field entitled "your learning needs and goals" teachers were asked to fill in a text box related to the their response to the question they had just completed "Where you have selected 1 or 2 for an indicator, please indicate where you would like support.

> *I need development in all these areas!!!I would like to focus on 1.4 first off. Differentiating teaching to meet the specific learning needs of students across the full range of abilities. In particular increasing reading rate for my struggling readers through engagement with ICT.*
> (Teacher A response APST Std 1-3 pre-intervention survey)

Where you have selected 3, please set a goal for future growth. Where you have selected 4 or 5, please provide some examples of your current practice." Below is a comment from one of the teachers

> *I am differentiating in Maths using digital tools by giving students the chance to show what they understand using various apps. For students with lower ability this allows them to communicate what they know without the need to write it down by filming or narrating their understanding of a topic. Students with varying level of ability can present their understanding and provide an insight into their problem-solving process using the apps Explain Everything or Educreations.*
> (Teacher D response APST Std 1-3 pre-intervention survey)

When comparing the pre and post data from the surveys the general trends had moved from a 1 indicating a perceived lack of competence to a 3 indicating that they felt competent. In some sub strands for example items 1.5 (strategies for teaching Aboriginal and Torres Straight Islander Students) and 1.6 (strategies to support full participation of students with disabilities) and item 2.3 (curriculum assessment and reporting the average response of the group had moved from a 1 (not yet competent) to a 2 still indicating a lack of competence from the teachers. Yet encouragingly item 2.1 (content and pedagogy in the teaching area), 2.3 (literacy and numeracy strategies), item 2.6 (Information and communication technologies) shifted from an average score of 1 not yet competent to an average score of 4 indicating high levels of competence.

> *I would like to continue my learning/research for standard 1.5. How can I best support my aboriginal students through ICT, in particular which IPAD applications are most successful and engaging for those students who need further support with literacy skills and knowledge*. (Teacher response post intervention survey)

This generated a rich set of qualitative data, which helped to shape the professional learning and the support provided to the teachers. Interviews were conducted with the participants after the intervention. During the interviews a series of structured questions relating to the teachers' experiences in the project, the use of the hardware, technology issues, the effectiveness of the network meetings and the effectiveness of the technology to as a classroom observation tool were discussed. The interviews were audio recorded and transcribed. They were analysed using Nvivo software and coded to see emerging themes.

### Reflection as a tool for teacher professional growth

Reflection was used as an important tool in this project. The teachers were asked to reflect on their teaching when they shared their classroom video at the network meetings. The reflective protocols were developed by the group, ensuring everyone felt safe when sharing their classroom videos. This set guidelines for reflecting on personal and colleagues videos in a non-critical manner and how to provide constructive feedback. During the final interviews the teachers engaged in an individual video reflection session while viewing their video. This session was video recorded and provided rich data on how the teachers related to their own video and their levels of understanding and engagement with their own teaching practice. These videos were tagged and analysed by the research using specialised video analysis software.

## Results

The analysis of the pre and post survey data indicated that most teachers made significant increases in their perceived levels of competence to deliver quality learning experiences as indicated in levels 1-3 of the APST. The teachers reported that the use of the self- monitoring video capture devices helped them to the to build their competence as they felt in full control of the videography process without the additional pressure of having another person in the classroom. The technology was cost effective and was easy for one teacher to operate using the remote device. This approach was more cost effective than the traditional approaches using video where another person needed to be employed to do the filming or regular classroom observation where teacher relief had to be paid to give a teacher the time to observe another teacher in action. There were complaints about the limited battery life of the devices. I recommend purchasing additional transformers plugs to enable use with the Australian electricity voltage.

Dissemination and sustainability were a major focus of the project. Social networking was used to support the professional learning network of teachers to help sustain the transformation of their teaching. The professional learning network was used to share video case studies and e-resources and to support future growth and innovation. A number of the schools have shared their learning in local network meetings. One school has a voluntary after school club for sharing pedagogy and ideas between the teachers. One of the participants has set up monthly breakfast meetings at the school to share learning and support other teachers.

The researcher plans to do further projects to extend and build on this research.

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