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# Theoretical and Practical Advances in Computer-based Educational Measurement

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# Chapter 18

## Feasibility and Value of Using a GoPro Camera and iPad to Study Teacher-Student Assessment Feedback Interactions



Fabienne van der Kleij, Lenore Adie and Joy Cumming

**Abstract** The importance of effective feedback for learning is widely recognised. However, much of the previous research on assessment feedback has paid limited attention to the nature of feedback interactions, and teacher and student perspectives. Innovations in technology have opened up possibilities to capture such interactions for research and professional development purposes. This study investigated the feasibility and value of using easily accessible equipment for practitioner use and research purposes. Specifically, the study focussed on use of a GoPro camera and an Apple iPad in capturing one-to-one teacher-student feedback interactions, and subsequent individual video-stimulated recall (VSR) for self-reflection. Six teacher-student pairs in three Australian secondary schools participated in the research. Evidence collected included technical data and characteristics of the devices, teacher and student experiences, and researchers' experiences and reflections. While the iPad and GoPro were both useful for capturing interactions, the iPad was more useful and practicable for VSR interviews. Findings suggest that such technology has potential for use by teachers and students to improve reflection and feedback interaction, and thus to enhance student learning. The researchers identified several technical issues that occurred in a range of settings and make suggestions to overcome these issues.

### 18.1 Introduction

The importance of effective feedback for learning is widely evidenced in international education research and policy (Stobart 2008; Wiliam 2011). The purpose of feedback is to provide information, to both teachers and students, to improve teaching and learning. While feedback can take many forms (Van der Kleij et al. 2015), feedback within classroom practice is generally realised through written and oral communications and interactions between teachers and students. The significance of

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effective feedback has been identified in research (Hattie 2009). However, research has also identified the variability of feedback effectiveness (Winstone et al. 2017). An effective feedback interaction between teachers and students requires development of some common understanding of goals and quality learning, and engagement by the students in progressing their learning (Black and Wiliam 2009). Thus, the quality of feedback interactions has become a major focus of education research and teacher professional development.

This chapter reports on a study that investigated the feasibility and value of using easily accessible equipment for practitioner use and research purposes. Specifically, we aimed to generate detailed insights into the feasibility of using a GoPro camera and an Apple iPad to capture one-to-one feedback interactions between teachers and students, used for subsequent individual video-stimulated recall (VSR) for self-reflection (Lyle 2003). We were interested in the comparison between these devices for practitioner use as well as for research purposes. Our research purpose also was to explore designs whereby teachers and students would be able to collect research evidence independent of a research team presence, using technology that could be readily available in schools. The overall purpose of such research is to develop effective but simple processes for use by both teachers and students to engage with feedback to improve learning. Important outcomes of this study are insights into possibilities and limitations of using these devices, possible ideas for improvement, and potential for upscaling to whole classroom contexts.

### ***18.1.1 The Value of Video Feedback***

Researchers have noted the advantages of using video for communicating feedback between teachers and students (e.g. Crook et al. 2012) and in peer feedback settings (Hung 2016; Lenters and Grant 2016). For example, Lenters and Grant (2016) noted the value of iPad video recordings as rich media for the communication of peer and teacher feedback. Teachers and students reported that use of these devices aided in smooth communication of feedback as intended, as meaning and intention often became distorted through only written feedback. One student in the study by Lenters and Grant noted the particular value of viewing body language in feedback communication as helping understand the intention behind feedback content.

The major advantage of using video in educational research is the opportunity to capture the full record of an interaction (Stigler et al. 2000), providing rich sources for reflection upon review. Reviewing video records of events has proven to be useful to support teacher self-reflection with the potential to encourage changes in teaching practices (Gröschner et al. 2015; Harlin 2014) and enhance teaching quality (Tripp and Rich 2012). The power of video lies in its possibilities to allow teachers to watch the recordings and view their feedback practices from a different perspective (Charteris and Smardon 2013; Harlin 2014; Jordan 2012; Van den Bergh et al. 2014).

Digital technology allows for video recordings to be immediately available for review and reflection. While the act of being videoed may cause teachers and students



to initially behave differently, research has found that this effect fades within minutes (Rowe 2009) with the benefits of the technology outweighing this limitation. One method that has particular value for self-reflection, going beyond simply reviewing an interaction, is use of recorded video as a stimulus for video-stimulated recall (VSR) (Lyle 2003). This method is suitable to gain insight into teachers' and students' thinking and feelings in feedback interactions, as the video stimulus helps them recall their thoughts and reflect on their own and each other's behaviour and actions (Van der Kleij et al. 2017).

VSR has also proven to be useful for use in feedback research involving teachers (Van den Bergh et al. 2014) and students (Hargreaves 2012, 2013). While video technology has been used to capture teacher-student interactions and reflections, the use of video technology as stimulus for both *teacher* and *student* reflection on the same feedback interactions is less well documented. This is the focus of our research design, with our study examining the potential of both GoPro camera and iPad technologies for research suitability as well as potential independent use.

GoPro cameras are compact action cameras, designed to capture a variety of activities. The camera can be positioned in a broad range of ways, for example on a head mount, chest mount, handheld monopod or tripod. In classroom settings, this opens up possibilities to record learner actions and interactions from unique angles (Hummel 2015). iPads are multi-purpose tablet devices, which can serve many educational purposes, such as a platform for educative games and simulations (Murphy 2016). Although the use of tablet devices such as iPads is becoming increasingly common in classrooms, their uses for capturing teacher-student interactions through its video functionality are not well documented.

## 18.2 Method

### 18.2.1 *Participants and Context*

The study occurred during a six-month period across 2015 and 2016. It involved six teacher-student pairs (Pairs A–F) in Year 9 (students aged 12–13) from three Australian secondary schools, with two pairs participating in each school. All participants were volunteers. The investigation focused on feedback interactions in three subject areas in order to capture a range of potential contexts: Science, English, and Health and Physical Education (HPE). For a more detailed description of the study participants, see Van der Kleij et al. (2017).

### 18.2.2 *Data Collection Instruments and Procedures*

In this study we used a GoPro Hero 4 silver, which has a display screen at the back for ease of camera positioning and reviewing of the captured material (contrary

to previous models). We used an iPad Air2 (64 GB) and used the default camera application.

Following ethics approval, school principals were contacted to request participation by two teacher-student pairs in their school. Teachers were asked to select a piece of student work to be discussed in a one-to-one feedback session with the student; this feedback conversation was the focal point of this study. The research involved teachers in different disciplines and allowed for a range of assessment formats and modes. However, the assessment design had to be based on the Australian Curriculum Achievement Standards evident in a formal marking rubric or criteria overview. The researchers did not prompt the teachers or students about the importance of feedback. Written consent was obtained from school principals, teachers, students and parents/guardians.

The data collection procedures for this study included three stages. In Stage 1, video data of 10–15 min feedback interactions were collected using a GoPro and iPad simultaneously from a similar position for comparison of usability of the two devices. Two researchers were present during the feedback sessions to support the operation of the technology.

Previously, we had investigated use of the GoPro camera as a wearable item for the teacher and student, a common use for this technology. However, occupational health and safety (OHS) requirements meant the camera could not be head-mounted and would need to be chest-mounted which may still cause OHS issues. As a chest-mounted camera would not capture interactions, and mindful of the OHS requirements, we investigated only the static camera. One of the teachers commented that replaying the video of a GoPro camera that was not in a static position when recording can result in motion sickness. Thus, using the GoPro in a static position appeared to be the most feasible option for this study.

Stage 2 involved VSR interviews with each student and teacher individually using the iPad. In other research using video-stimulated recall, the focal instances that participants have been asked to comment on have been identified by the researcher or the participant, or both (Rowe 2009). For example, in Hargreaves' (2012, 2013) study involving primary education students, the focal instances were identified by the researcher. In our study, a researcher asked the participant to pause the video at points they identified as relevant, and reflect on those instances. By interviewing both the teacher and student separately, we were able to directly compare their reflections on the feedback interaction, and the significance of different aspects of the feedback for each. The VSR sessions were audio recorded and took approximately 20–30 min. Video recordings and VSR sessions were transcribed for research analysis.

We requested for the feedback conversations and the VSR interviews to take place in a relatively quiet space, where no other students would be captured on video, for example, a small office, the library, or a quiet corner of a classroom. However, on some occasions this was not possible due to the organisation of a high school timetable and the types of feedback sessions that were recorded. As a result, the data were collected in a range of different settings. This, of course, reflects the reality of diverse settings for teacher-student interactions in schools.

Our initial intention was to have 50% of the participants watch the GoPro video on the iPad, and 50% watch the iPad video on the iPad. However, a preliminary outcome was that switching the GoPro Wi-Fi connections between the remote control and iPad was time-consuming, and the battery life of the GoPro appeared insufficient to do this. For this reason, all participants were shown only the videos taken by the iPad, on the iPad.

Stage 3 involved a short teacher questionnaire regarding their experiences using the GoPro and iPad for capturing the feedback conversation and self-reflection (See Appendix 1). The researchers also recorded written observations of the technical set-up as well as the dynamics of the teacher-student interaction, and took notes of any technical issues that emerged or issues identified by the teacher or student during the data collection process related to the use of the GoPro or iPad.

The positioning of the cameras differed across observations, depending on the data collection setting. Teachers and students were asked to sit as they normally would in a one-to-one feedback interaction. Video resolution of the GoPro can be modified; it was set at the same resolution as the iPad ( $1920 \times 1080$  pixels) to allow for direct comparison of the image quality. Videos were recorded on medium screen width in order to minimise the fish eye effect. We used a Wi-Fi remote to start and stop the recording. We used the rear camera on the iPad, placed diagonally behind the GoPro, as the aperture in the video function required the device to be farther back than the GoPro.

No additional microphones were used to enhance the quality of the sound as the aim was to test the default quality of these two video technologies. However, a special case was necessary so that the GoPro could be mounted on a tripod without covering the microphone. No external speakers were used to enhance the volume of the videos during the VSR sessions. The simplicity of the set-up and the minimalist equipment requirement were essential to test the ease to which these devices could be independently used by teachers for both research and pedagogical purposes within a variety of educational contexts.

### ***18.2.3 Analysis***

Feasibility of the GoPro camera and iPad was evaluated based on the following criteria:

- (1) quality of the image;
- (2) quality of the sound;
- (3) battery life; and
- (4) ease of use.

Two members of the research team operated the equipment for recording the feedback interactions. However, ideally teachers and students should be able to independently collect the video data. Ease of use was therefore an important criterion.

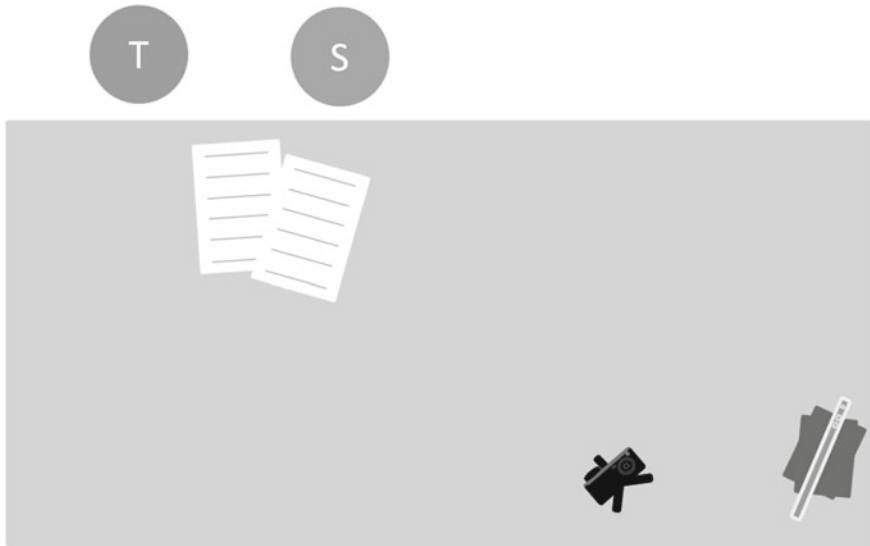
In order to analyse the feasibility of the two devices for capturing one-to-one feedback interactions we analysed three sources of data, taking account of the different contexts in which these data had been collected:

- (1) *Technical data and characteristics of the two devices.* The quality of video data from the devices was compared for feasibility to capture teacher-student interactions, with the possible extension to use in whole classroom interactions. Specific attention was paid to the evaluation of visual and audio quality of the data and comparison of the GoPro camera and iPad as technological tools to inform future research. The researchers' field notes on technical matters were analysed qualitatively according to the four specified criteria to evaluate the feasibility of the GoPro camera and iPad for the particular research purpose.
- (2) *Teacher and student experiences.* Comments made by teachers and students during the VSR regarding the experience of being video-recorded and participating in the VSR were analysed qualitatively. The data were coded using purposefully designed coding frameworks for the feedback interactions (Adie et al. 2018) and VSR interviews (Van der Kleij et al. 2017, Fig. 3). The elements of the VSR coding framework that were relevant to this paper were 'experience and reflection on being video-taped' and 'value of video reflection and insights'. In addition, teacher and student comments were considered within "a descriptive model of key conceptual influences on learners' proactive recipience of feedback" (Winstone et al. 2017, 31). This model was derived from a synthesis of the literature related to the students' role in feedback processes. The model emphasises the influence of feedback interventions on the proactive recipience of feedback, through the interplay of the feedback receiver's self-appraisal, assessment literacy, goal-setting and self-regulation, and engagement and motivation, and various interpersonal communication variables, such as the characteristics and behaviour of the feedback sender and receiver. Teacher surveys on their user experience were analysed both quantitatively and qualitatively, to take account of teachers' qualitative comments.
- (3) *Researchers' experiences and reflections.* Researchers' field notes were synthesised to provide overall considerations of the comparability and success in using the two devices for the research process.

## 18.3 Results

### 18.3.1 Technical Results

The feedback interactions took place in different types of rooms that were representative of the diversity of teaching spaces that could be encountered in schools and in a research project. As a consequence, the quality of the video footage obtained differed widely across the four different settings. As the study progressed, some procedures were revised slightly as a result of learnings from data collection experiences



**Fig. 18.1** Camera set up school 1

at the previous school. Table 18.1 provides an overview of the camera set up and characteristics of the data collection instances, along with issues identified.

The quality of the visuals was satisfactory for both devices across all recordings. In School 1 (see Fig. 18.1), an issue was that the researchers' small tablet tripod did not allow for filming at an appropriate angle, therefore a stack of books of approximately 10 cm in height was used for better camera positioning. This camera angle was still not optimal in the second video with a slightly taller teacher. After data collection in School 1 a height adjustable floor stand with a 360° flexible angle for the iPad was purchased to allow for greater flexibility for data collection in Schools 2 and 3.

The flexible floor stand was valuable as it allowed for greater flexibility for camera positioning of the iPad. The GoPro tripod was easily adjustable in height and angle, and the use of the remote helped keep the camera in position.

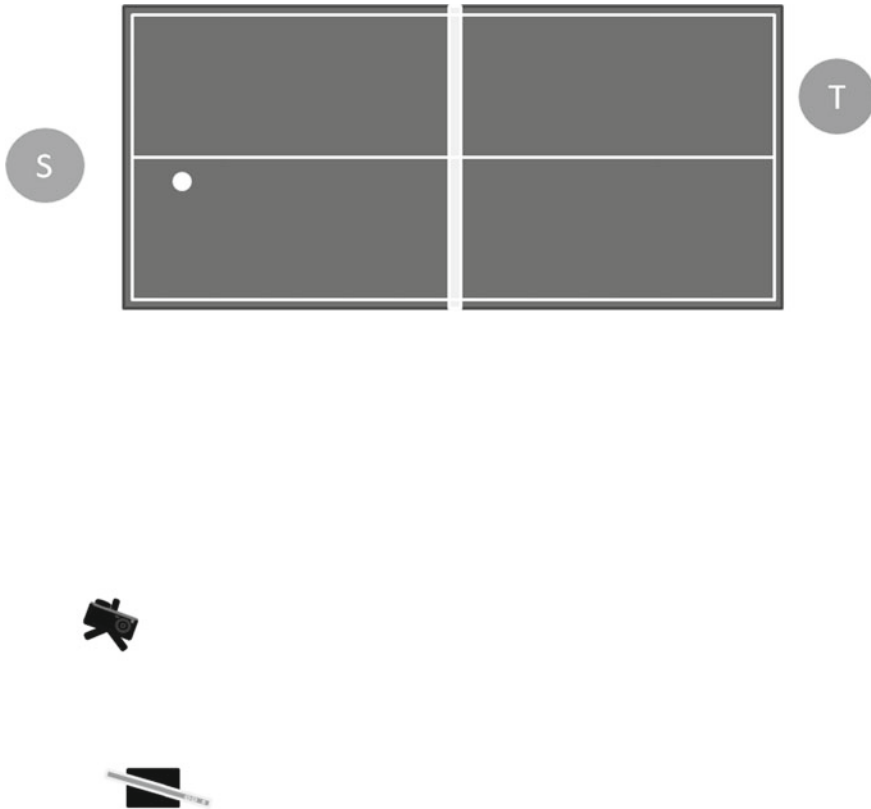
The audio volume of the video was acceptable for most of the GoPro recordings, but it must be noted that we used a special case that does not cover the microphone. At times, the volume of the videos recorded on the iPad was too low. This was especially the case when the iPad had to be positioned farther away from the participants, and in noisy environments and large spaces.

In School 2, videoing of the first feedback interaction took place in an HPE hall with open sides. The table tennis table of the participating teacher and student (Fig. 18.2) was slightly separated by a heavy-duty curtain from the rest of the tables on which the other students played.

This was a noisy environment for videoing; as a result the sound quality for both the GoPro and iPad videos was poor, and it was not possible to transcribe all participant dialogue. However, the teacher and student were still able to use the video in the

**Table 18.1** Description of data collection: setting, positioning and identified issues

Data collection instance	Data collection setting	GoPro positioning	iPad positioning	Issues identified
School 1 conversations A and B	Large quiet meeting room of 10 m × 5 m	25 cm high tripod on table	Small tablet tripod on top of stack of books of 10 cm on table	Angle of iPad not optimal
School 2 conversation C	<ul style="list-style-type: none"> <li>• Video recording: HPE hall, participating teacher and student were slightly separated from other students</li> <li>• VSR: staffroom adjacent to the HPE hall and sports field</li> </ul>	58 cm high tripod on floor	125 cm high floor stand	<ul style="list-style-type: none"> <li>• Noisy environment</li> <li>• iPad was placed 1 m farther back from the GoPro to capture both participants on video, resulted in poor audio quality</li> </ul>
School 2 conversation D	Large and mostly quiet meeting room of 5 m × 8 m	25 cm high tripod on table	125 cm high floor stand	<ul style="list-style-type: none"> <li>• Some background noise from students in hallway</li> <li>• Volume of video recording not loud enough during VSR</li> </ul>
School 3 conversations E and F	Small and narrow room of 4 m × 2.5 m with windows on both long sides of the room	25 cm high tripod on table	125 cm high floor stand	<ul style="list-style-type: none"> <li>• Very small room, iPad position very close to the wall in order to capture the image</li> <li>• Difficulties positioning camera as not to capture other students on camera through windows</li> </ul>



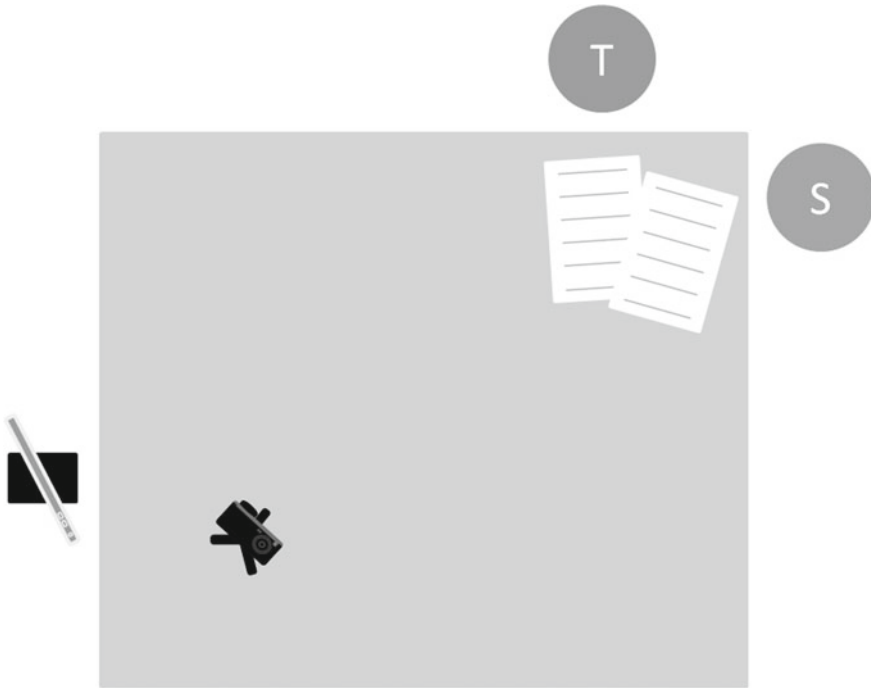
**Fig. 18.2** Camera set up School 2, Conversation C

VSR sessions, which occurred in the staffroom adjacent to the hall and a sports field. While this was also a noisy environment at times, as students were playing sports outside and other teachers were also working in the office, the quality of VSR audio was satisfactory for research transcription.

The feedback interactions and VSR interviews with the second teacher-student pair in School 2 took place in a large and mostly quiet meeting room (Fig. 18.3). However, the recording did pick up the background noises when students were moving between classes and congregating outside the meeting room.

The volume of the video recording was not quite loud enough, despite conducting the videoing in a quiet room. This may have been caused by the size of the room and the distance of the iPad to the participants when recording the video.

In School 3, the feedback interactions and VSR interviews took place in a small and narrow room with windows on both sides on the long sides of the room, which posed challenges with respect to positioning the cameras. The GoPro was positioned using its tripod on the table opposite the teacher and student. The iPad had to be in the far corner of the room, very close to the wall, in order to capture the image of



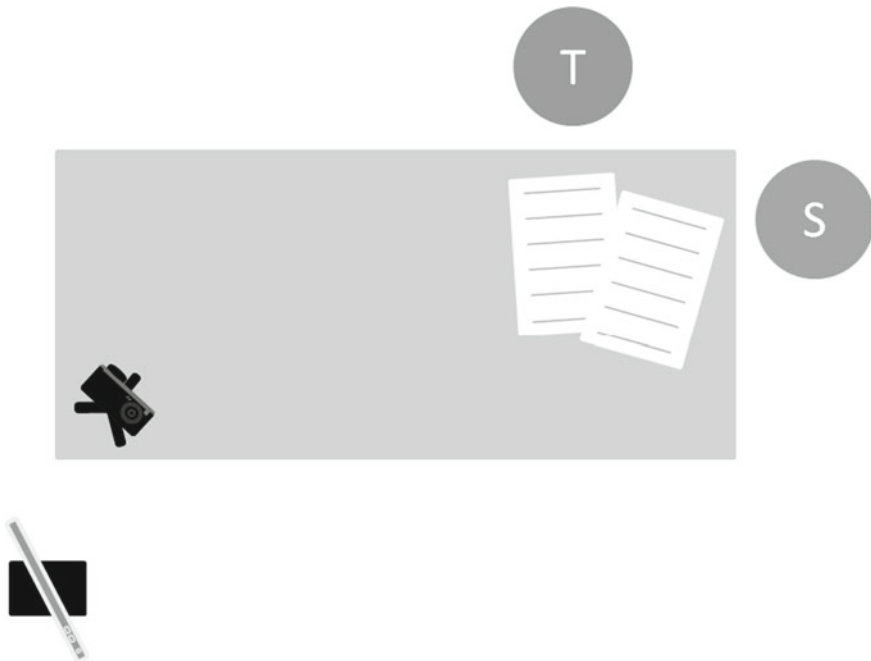
**Fig. 18.3** Camera set up School 2, Conversation D

both the teacher and student (Fig. 18.4). There was some outside noise as students moved between classes during the video recording.

Battery life of the two devices was compared during data collection at School 1. Upon commencement of data collection both the iPad and GoPro were fully charged. After recording two feedback conversations (approximately 19 min in total) the GoPro battery was 1/3 full. The use of the remote control and Wi-Fi function caused the battery to run low quickly. The iPad had retained 85% of battery after filming two feedback conversations and replaying of videos to two teachers and two students. Thus, the battery life of the iPad was noticeably better than that of the GoPro.

Teacher survey responses (Appendix 1) further complemented the technical results. The survey first asked whether teachers thought the GoPro is a suitable device to capture teacher-student interactions. Two teachers were neutral, one teacher strongly agreed, one teacher disagreed, and the other two teachers did not respond to this question. The reason one teacher strongly disagreed was based on personal experience rather than this project, and due to the fact that when the GoPro is not in a static position when recording, replaying the video can result in motion sickness. The teachers who did not respond to this question had focused their attention on using the iPad, ignoring the recording on the GoPro.





**Fig. 18.4** Camera set up School 3 (in conversation E the teacher and student positions were reversed)

Five teachers strongly agreed and one teacher agreed that the iPad is a suitable device to capture teacher-student interactions (Question 2). Four teachers strongly agreed and two teachers agreed that the length of the video observation was appropriate (Question 3). The fourth question focused on the quality of the sound when replaying the video. Three teachers strongly agreed, two teachers agreed, and one teacher disagreed that the sound quality was good. The different contexts for recording may account for these differences in response. Five teachers strongly agreed and one teacher agreed that the quality of the visuals when replaying the video was good (Question 5). None of the teachers indicated having experienced any issues while being recorded by the GoPro or iPad.

### ***18.3.2 Teacher and Student Experiences***

As stated, the following data were analysed using the Winstone et al. (2017) descriptive model of feedback recipience. This model encapsulates the purpose of feedback, the interpersonal communication variables of the feedback sender and receiver, and the factors that affect recipience of feedback.

### 18.3.2.1 Participant Reflections on the Experience of Being Video-Recorded

The experience of being video-recorded differed for each of the participants. Some participants took a few minutes to relax and forget about the cameras, while others did not seem to be aware of them. In response to a survey question about issues experienced while being videoed and during the VSR, one teacher reported: “Only nerves and embarrassment! I’m sure I’ll get over it with more experience” (Teacher A). Feelings of nervousness appeared to be temporary in both teachers and students. The results align with findings by Rowe (2009) that while the video camera may initially distort the normal interactions between teachers and students, it is soon forgotten even in the short space of a 10–15 min feedback session. This finding adds credibility to the use of video research data of classroom interactions.

During the VSR sessions, four teachers (A, D, E and F) reflected on the experience of being video-recorded and watching themselves back on video (see also Van der Kleij et al. 2017). For example, Teacher A said:

It was very nerve-wracking at the beginning. I didn’t expect it to be ... But it was. It was like, ‘Whoa.’ I even slowed down my talking towards the end. At first I was like, ‘Blah, blah, blah, blah.’ Maybe having a camera around more often will relax you more... and get over it.

As the teacher watched the video there is an evident awareness of a tendency to talk rather than listen. While the teacher attributed this response to being videoed, there is recognition of the need to slow down ‘talking’ to communicate feedback. In addition, later in the VSR, the teacher further noted that the student’s facial expression in the video indicated confusion. It is possible that these insights may trigger a response to slow down in future feedback interactions with a student or with the class. In this instance there is a possibility that the VSR may stimulate a visual memory to slow down communication and check on receipt and understanding of feedback.

Teacher F also indicated initial nervousness about being video-recorded as he reflected on what he had learnt from watching the video:

I’m learning that I ask very long-winded questions, but I think I was a little bit sort of—it sounds silly—but nervous at the start, like just, ‘Is she going to say anything?’ So you’re sort of trying to put it in—put it in her mouth—not put it in her mouth, but like, I don’t know, instigate it maybe a bit too much. No—yeah it’s—it’s all right, it’s good. She’s an easy student to talk to, I think the manner—my manner and everything’s okay, it’s just weird when you see yourself doing that [laughs] ... I was cringing there for the first part, to be honest.

In this instance, the teacher is cognisant of his own characteristics as feedback provider and the interpersonal variables that are critical to effective dialogue. Student F also noted that Teacher F was very nervous:

I can tell in this video Mr [teacher] is really nervous. I can tell—in the sheets he’s drawing scribbles, he was, he was just drawing. I could tell he was nervous, but he also kind of like spread humorous, a humorous aura around. And that just honestly—I’m nervous as well, I don’t like interviews, I just don’t like it—but it kind of made me less nervous, because he’s being funny, he’s being himself as a teacher.

The student also identified the importance of the feedback provider’s behaviour and how this affected her feedback recipient connecting “a humorous aura” to being “less nervous”.

Teacher D identified an instance in the video where the experience of being video-recorded made her feel as though she was in a high-stakes situation:

I wanted it to be an accurate feedback so it would be useful for him. And doing it on the spot and with him, and with you guys filming, was quite high stakes at that moment because I was like I don’t want to say the wrong thing here, I don’t want to be too liberal, too conservative, I want it to be accurate.

Teacher D indicated her concern with the alignment of her feedback to the curriculum standards and ensuring the feedback was useful to the student. She focussed on her manner of feedback delivery, the characteristics of her feedback message and consideration of subsequent student engagement with her feedback in the context of being videoed.

In contrast, students appeared to be less self-conscious than teachers; only two students (Students B and F) commented on the experience of being video-recorded. Although the majority of teacher participants experienced nervousness due to the presence of the cameras and/or researchers (Teachers A, C and F), only Student F verbally expressed nervousness. However, in some cases the teacher did note nervousness in a student. For instance, in response to the question “How did you find watching the video? Did you learn anything from it?”, Teacher E replied: “She was giving very good feedback but she just looked more nervous on the film than what I felt she was. Just to be more aware of that ... I do feel like it went well”.

When replaying the video Teacher E commented on the student’s affective state, which, as she stated, she had not been aware of during the feedback session. As a result of the VSR, the teacher noted that this was an aspect of her practice that she wanted to take into consideration in future feedback interactions. The teacher’s response also shows her recognition of the student as feedback provider of information that can be used by the teacher to improve her practice.

### 18.3.2.2 Participant Reflections on the Usefulness of Using Video for Recording and Reflecting on Feedback

Replaying the video and reflecting on the feedback conversations proved to have considerable educational value. See Van der Kleij et al. (2017) for a detailed analysis and overview of the nature of teacher and student VSR comments. Student reflections mainly focused on reviewing content and strategies for improvement, and reflecting on the characteristics of the feedback message and manner of feedback delivery (Winstone et al. 2017). The nature of the teacher reflections varied more broadly, focusing for instance on characteristics and behaviour of themselves as a feedback sender and the characteristics and behaviour of the student as receiver of feedback, the alignment of feedback to assessment criteria and standards, as well as characteristics of the feedback message and manner of feedback delivery.

The teachers' and students' comments on participation in the video-recorded feedback interaction identified their ability to critique their own performance and reflect more deeply on the others' behaviours. Teachers expressed having gained insights from watching the video about their feedback practice, for example, needing to emphasise the positive, double check for student understanding, and provide time for students to identify quality elements and areas of concern within their own work. For example, Teacher A noted that her feedback was highly corrective in nature, and did not sufficiently recognise the student's strengths. Teachers B, D and F identified instances where they gave the student feedback or asked a question but did not give the student a chance to respond. Teacher C also noted that he might have spoken too much:

It's nice to sit back and see patterns develop, from an outside view. I think there were a couple of times there where I might have spoken too much instead of like let's play roll on. But at the same time it was good to see where I jumped in and offered feedback ... it's amazing to see how much change can happen when you isolate someone for ten minutes.

Teacher C has connected the importance of the context, in this case opportunity to engage in one-to-one feedback, even if only for a short (10-min) period of time and the proactive recipience of feedback to cause changes in student behaviour and learning.

Through watching the video, teachers were able to identify the student's emotions in the feedback interaction thus raising their awareness of the affective impact of their feedback. For example, Teacher A observed embarrassment in Student A, and reflected: "I wonder why she looks embarrassed. I'll ask her why did she look embarrassed—because I think because we pored over and over and over it and she's like, 'Oh yeah, I know that.' Or is it just because she didn't realise?" In this interaction, Student A did not contribute much beyond a single response as acknowledgement of the feedback (e.g. "yeah") while Teacher A provided extensive feedback on all aspects of the student's assessment response. Teacher A's VSR reflection suggests an emerging awareness that feedback involves interpersonal communication rather than a one-way transmission of information.

For students, the degree of self-reflection in VSR responses appeared to be related to the way in which the teacher had structured the feedback context (see Van der Kleij et al. 2017). Most of the students identified that they valued reviewing the feedback as it gave them the opportunity to review key points that were missed in quite densely informative conversations. For instance, Student A noted that there was a lot of information to take in during the feedback session, and reviewing the video was helpful. Student D identified that replaying the video was helpful: “I could have missed something while I was listening to her”. The students’ comments showed an awareness of the manner of feedback delivery (e.g. the quantity of feedback), the characteristics of the message (e.g. the density of information), and the interaction with their own characteristics as feedback receivers. They acknowledged that processing and acting on feedback was important but that they required further time and opportunity to revisit feedback.

Although the research involved only one-on-one feedback interactions, the teachers reported the usefulness of these conversations for their teaching as well as student learning. When asked whether she had found the experience useful, Teacher D replied: “Yes, terrifying [laughing] but very useful”. In the survey, four teachers commented on the usefulness of the experience when asked if they had any other comments. Teacher A noted: “I think it’s really worthwhile and am going to try recording my feedback again!” Teacher A recognised the value of the VSR for her reflective practice and the potential for enhancing her feedback practice. Teacher F wrote: “I thought the process was worthwhile and contained elements I could use in my professional practice”. Teacher F related her learning from the VSR to her classroom teaching practices more broadly. The teachers’ comments indicate that the VSR process supported their reflective practices that moved beyond the one-on-one feedback context to consideration of whole class interactions.

### ***18.3.3 Researcher Experiences and Reflections***

Overall, both researchers involved in the video process noted use of the technologies to be smooth and relatively problem free. However, there were specific aspects that required attention dependent on the different locations. When setting up the iPad it is important to take into account the aperture, as the image automatically zooms in when switching to video mode. For this reason, the iPad was positioned farther back than the GoPro. However, this sometimes resulted in low volume in the video recordings. Another important note was that the iPad automatically reverts to camera mode, so it needs to be set on video mode when setting up the camera, and needs to be reset on video mode shortly before recording commences.

In this study the teachers were requested to have 10–15 min feedback conversations. The actual length of the conversations varied between 6 and 18 min with an average 12 min 46 s. Our observation was that in some cases the length of the feedback session and subsequent VSR session was too long for students to review. In the lengthier feedback sessions, there was often too much information for students to

remember and then act on; after watching the video, regardless of length, the students recalled no more than three main points from the feedback interaction to address in their work.

Use of the technology was observed to cause only minor technical difficulties for the participants. The video could be started by tapping a play button in the middle of the screen, but had to be paused by tapping a small pause button in the right top corner of the screen. While none of the participants required explanations on how to play and pause the video on the iPad in the VSR sessions, in a number of instances the participants accidentally touched the screen in a place that caused the video to replay from the beginning. This was a minor issue as the iPad did not show the time elapsed when replaying the video, and it then took time to retrieve the right point of play in the video to resume the review of the feedback conversation.

Another technical difficulty relevant for research involved time stamping the instances when the teacher and students paused the video to comment on the feedback interaction, as the time elapsed did not show in the video player (this feature has become available in more recent updates, but the time still only displays for about a second). It was possible to hear the video in the background of the interview, but time-stamping the video pauses was a time-consuming activity involving two researchers to check the accuracy of this record.

## 18.4 Discussion

This study trialled the technical and experiential feasibility of using a GoPro camera and iPad to capture one-to-one feedback interactions between teachers and students for reflection on feedback interactions, to inform the design of future research projects. Both technologies are easy to access, and iPads, in particular, with a broader range of educational uses are common in schools. The iPad, as a multi-featured device, presented several advantages as well as disadvantages. The advantages included ease of replaying video, screen size for replaying video, ease of sharing or transferring videos, battery life and familiarity to teachers and students. The main disadvantage of the iPad was that the distance required for videoing resulted in low audio quality. This could be addressed by using either a fish eye lens to enable closer camera positioning, or by using an additional microphone to capture audio. Another potential disadvantage of the iPad, although it did not occur during our data collection, could be the video recording stopping during times when connected to the Internet and a phone call occurs. The solution to this would be to have the iPad on airplane mode when recording videos. On the other hand, limitations of the GoPro as standalone technology for this type of research mainly related to the small size of the screen to replay the video. While the GoPro camera was compact and easy to mount, this form of research required a tablet or PC to facilitate VSR processes. As a practical consideration, the GoPro required spare batteries as the recording used much charge.

One critical feature for our research purposes was to know when the teacher and student paused the video in order to compare the different instances they identified as critical in the feedback conversation. However, the elapsed time did not show in the iPad's video player, so while records were made of key words spoken at the time, we had to listen carefully to the feedback conversation in the background of the interview recording to identify these times. In future research we recommend that researchers take note of video pause times.

It has been reported in previous research using VSR that some teacher participants were not willing to watch their video recordings in discussion with the researcher, because they were not satisfied with their behaviour (Rowe 2009). This was not the case in our study, although some teachers and students appeared initially uncomfortable watching themselves on video. However, their interest in reviewing the feedback conversations, especially for the teachers, appeared to overcome this reaction. Reviewing video evidence enabled students and teachers to observe reactions through facial features and body language. The visual evidence was seen to provide new information for reflection. During feedback conversations both teacher and student eyes were mostly focused on the student work or scoring rubric. Through use of VSR, the participants were able to focus on the social interaction.

The teachers' comments revealed their attention to multiple dimensions of the feedback conversation including characteristics of the feedback message, the manner of feedback delivery, their own and student characteristics and behaviour and the interaction of these variables (Winstone et al. 2017). The VSR allowed teachers and students to review both verbal and physical responses to the feedback. The teachers were critical of their own behaviour as feedback provider, especially when they identified that they had monopolised the conversation rather than allowing more time for student response, or when the characteristics of the feedback message mainly focused on correcting mistakes rather than also identifying strengths in the student's work. Replaying the video also enabled the teachers to more clearly identify the student's emotional reaction in the feedback interaction. Teachers' survey responses indicated that use of video technology independently to capture teacher-student interactions had potential to improve these interactions and enhance their feedback practice in general, because of an increased awareness of their current feedback practices. To a lesser degree, but still significant, most of the students articulated that they valued reviewing the feedback as it gave them the opportunity to hear again key points that were missed in quite densely informative conversations.

The teachers in the study commented that this form of one-to-one feedback was not common practice, though at the conclusion of the feedback session, they noted the value for student learning, and for their feedback and classroom teaching practice. Since the VSR was not difficult to set up for one-to-one feedback sessions, it would add minimal time to the feedback interaction, especially if the teacher was conducting organised conferencing sessions. The issue in this case is not related to the technology but rather the purposeful scheduling of time. Based on our findings, we hypothesise that the methods used in this study can be replicated by teachers to enhance classroom feedback practices. Engaging in VSR has the potential to enhance proactive receipt of feedback (Winstone et al. 2017) by making both teachers and

students aware of their verbal and physical contributions and responses to the feedback interaction.

Extending the research from teacher-student interactions to capturing whole classroom interactions would require additional technologies. Previous video research on formative assessment in a whole classroom situation (Gotwals et al. 2015) used a camera at the back of the classroom and a cordless microphone worn by the teacher. In this type of set up the researchers reported not always being able to capture students' voices in student-student or whole class interactions when the teacher was not nearby. While the GoPro camera can be positioned at different angles, a similar issue identified by Gotwals et al. (2015) may be the inability of the GoPro microphone to pick up student conversations. Similarly, additional technology, for example, a Swivl™ with several wireless markers with microphones, is required for the iPad to capture voices accurately when not in proximity to the camera. When iPads are positioned near students to capture conversations, the use of a fish eye lens for the iPad will enable participant images to be captured on screen.

## 18.5 Conclusion

This study trialled two technologies that are easy for schools to access regarding the quality of the sound and image and ease of use including battery life, in a range of educational contexts. The focus was teacher-student feedback interactions for the purpose of improving learning. The findings showed that while the iPad and the GoPro camera were both useful for capturing the feedback interactions, the iPad was more useful for video-stimulated recall interviews. With schools increasingly purchasing this type of technology, this finding suggests that this technology has potential for independent use by teachers and students for reflection to improve feedback practices. Through the use of these simple technologies, our project has been able to identify the relationship between teacher and student perceptions of feedback conversations. Most importantly, for our research purposes, it has potential for optimal data collection by enabling larger research data sets to be collected in a range of locations to illuminate the 'black box' (Black and Wiliam 1998) of classroom interactions and assist improvement of teaching and student learning. Additional technology is needed to upscale the use of the two devices to capture and facilitate reflection on whole-classroom interactions, but overall iPads seem more suitable for this type of use.



## Appendix 1. Teacher questionnaire

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. The GoPro camera is a suitable device to capture teacher-student interactions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The iPad is a suitable device to capture teacher-student interactions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. The length of the video observation was appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The quality of the audio when replaying the video was good	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The quality of the visuals when replaying the video was good	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Did you experience any issues while being recorded by the GoPro or iPad?
7. Do you have any other comments?

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