

# Digital Video as a Tool in Research Projects: Zooming In on Current Issues

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**Abstract:** Digital video and accompanying editing software are increasingly becoming more accessible for researchers in terms of ease of use and cost. The rich, visually appealing and seductive nature of video-based data can convey a strong sense of direct experience with the phenomena studied (Pea 1999). However, the ease of selection and of editing of digital video clips means that researchers need to be aware of possible bias inherent in presentation of video vignettes and they also need to monitor the authenticity of clips. Issues of confidentiality and ownership are important and need to be thoughtfully considered by researchers before this new technology becomes ubiquitous in qualitative educational research. The paper discusses ways in which digital video was used as a research tool in a project and explores the above issues as experienced in the project.

## Introduction

This paper provides a brief overview of some of the issues surrounding the use of digital video as a research tool in education projects and contextualizes this discussion in a research project currently being conducted in Australian schools by the authors. Ongoing developments with digital video cameras, computer hardware and editing software increasingly make video use a viable option in research methodologies and, consequently, new ways of using, analyzing and presenting video data are occurring (Pea 1999; Walker 2002). For instance, relevant video clips can be added to reports and papers to promote a richer discussion, highlight issues and provide opportunities for the reader to have access to data in an expanded number of ways. This paper contributes to the debate on the changing nature of qualitative research techniques in the light of new technologies, and highlights the need for enhanced critical skills in “reading” multimedia research documents.

## Background and Motivation

The authors are presently engaged in a collaborative research study, *Developing Pedagogy using Student-Generated Digital Video*, involving case studies of five schools in Australia. The schools were asked to participate in the study because they were known to be using digital video in innovative ways with their students. Our interest in these case studies was in developing an understanding of the ways in which pedagogy might be influenced by the use of this technology, and hence the research questions explored the processes and roles of teachers and learners working with digital video in these schools. The case studies comprised visits to each school over a period of two to four days, in which lessons were observed, and students and teachers interviewed, with a focus on the way that student-generated digital video was being used to enhance learning. Audio tapes were used to record interview material, and video was used in the classrooms to capture the events occurring during the lessons. After each school had been visited, one member of the research team developed the case study of that school from the data that had

been collected. The project is currently in the final phase, in which reports are being generated and papers written. For further details of this project see (Kearney & Schuck 2003).

The methodology for this study is supported by educational technology theorists (such as Neuman 1989; Salomon, Perkins & Globerson 1991) who have advocated more naturalistic studies that provide appropriate data about relevant social and cognitive processes in order to explore the affordances of innovative technologies for learning. By developing an understanding of ways in which teachers' beliefs, pedagogical approaches, and contextual factors inhibit or encourage good practice in the use of student-generated digital video, the researchers are developing a set of principles that indicate good practice in using this technology to improve student learning.

While the focus of the five case studies is on student-generated digital video and its impact on pedagogy, this paper will discuss the researchers' use of digital video as a research tool to collect, analyse and interpret data and disseminate findings of this study. During the case studies and preparation of reports, the researchers used digital video to highlight important incidents, expressions, conversations and activities, as well as to develop ideas, illustrate points and provide consistency between the topic being researched and the ways of researching it. As the researchers worked with this medium, various issues arose that indicated that the use of digital video for enhancing the understanding of the case study was not unproblematic. However, the use of digital video as a methodological tool has proven to be an effective way of illuminating our results and providing valuable insights that might not otherwise be available. This paper will discuss the value of digital video as a research tool in our study and explore issues that emerged from this use.

## **Use of Digital Video as a Research Tool in Other Studies**

Given that the authors have used digital video as a research tool in a qualitative, multiple case study, the focus of this discussion about the use of digital video in research methodology will be restricted to similar qualitative studies. We will consider what other researchers suggest as the value of using video in their research, particularly in the digital format.

### **Data Collection and Analysis**

The advantages of video-based data to a study are its permanence as a record, its retrievability, and its availability to other researchers to check findings, with the possibility of reinterpretation (Plowman 1999). Digital video adds to the value of video-based data collection, with the ability to annotate clips, find them easily, select clips for future use and edit the video. For example, Mousley (1998) coded relevant snippets of video and linked them to a spreadsheet. Included on the spreadsheet were notes of the clips' origins, categorisations and short descriptors. She subsequently made transcriptions that provided an easily navigable and searchable resource for re-visiting later, and a basis for careful data analysis. Plowman (1999) also carefully labelled and logged videos to help future searching and emphasized the flexible nature of the data with the ability to go back and review material repeatedly. She did, however, acknowledge the problem of video being relatively inaccessible and even in digital format, it needs to be viewed and coded in real time.

### ***Triangulation of Data***

The use of video-based data can be seen as a method of supplementing other data. Williams and Clarke (2002) take up this issue of triangulation in classroom video research, in particular, the contribution of the 'student voice' to research methodology. They believe that validity is improved by providing extra sources of data to supplement video-based observation. In their study, they explored the teaching and learning of mathematics as viewed from the perspective of the learner, using videotape of a sequence of lessons, post-lesson video-stimulated student and teacher interviews, collections of student work and teacher questionnaires as data. Although the video data were sometimes interpreted by the researchers in different ways, corroborating evidence from other data sources was used to revise these interpretations (or indeed retain alternative interpretations). Plowman (1999) also used a range of other data sources to triangulate with her video-based data, pointing out that video does not capture unobservable processes such as thoughts, attitudes, feelings and perceptions. Thus, copious field notes, questionnaires, interviews, informal discussions and video-based, stimulated recall sessions were used to collect

information and check on validity of findings. Finally, Walker (2002) believes video-based data helps the reader to perform their own validity checks: "... access to the video ... shifts our gaze, exercises our capacity to triangulate and amplifies our appreciation of the complexities of classroom interaction" (p. 119).

### ***Video-Stimulated Interviews***

Video or photographic data from the field can also be used in interviews to stimulate good conversation and produce rich data. This technique may help interviewees decipher more quickly the meaning of researcher questions, provide a focus for their responses and prompt their memory of past events. Indeed, Mousley (1998) has handed teachers video snippets to think about *in preparation for* an interview but noted that some complexities of classroom interactions presented by video data can be distracting for research participants. For example, she found teachers in video-stimulated interviews were distracted by their own looks, clothing, expressions, vocal tenor etc. To help solve this problem she used still photograph-stimulated interviews by extracting the photos from the original digital video footage.

### ***Split-Screen Displays***

For studies involving computer-based learning environments, Plowman (1999) discussed the possibility of combining video footage of the computer users with a recording of their 'on-screen' interactions. In her study of students using a CD-ROM, she used video to collect data about the language and interactions in the classroom. She also wanted to investigate how students navigate through the software and how design features interact with students' learning strategies. Hence she used two video recordings: one showing the group of students at the computer, positioned to capture talk, movement, gesture and interactions with the computer; and the second taken from the computer screen via a 'scan converter' (i.e. the signal from the computer is recorded directly on to video.) Both recordings were synchronized and presented as valuable data in a 'split-screen' display for analysis.

### ***Use of Video for 'Thick Description'***

One major discussion point for Goldman-Segall (1990) in her study exploring children's thinking in a Logo constructionist culture, was the use of video as a primary source of data. In this doctoral study, the researcher built up video-based 'thick descriptions' (Geertz 1983) of participants and their actions and created different 'video slices' of events. Video clips provide the researcher with a way of articulating what is seen, although, like all interpretive research, it is "imprisoned in its own immediacy or detail" (p. 32). Indeed, every reader will access the data differently and will view the same data 'through different eyes'. However, an appropriate 'thickness' of description will hopefully mediate the extent of these interpretations: "The thickness of the description of the act, event, or process may provide a measure to ensure that conclusions, although not the same, fall in the same range" (p. 33).

### **Presentation and Dissemination**

Illustrative digital media can be presented with text as part of a multimedia document in the dissemination stage of the research process (Pea 1999). Indeed, Walker (2002) believes we need to move beyond textual forms of research dissemination to make visual evidence available to the reader in this new genre. He discusses the advantages of multimedia environments to present educational research where the reader reads the text of the case in combination with other digital media-based source material.

Mousley (1998) discussed the interesting technique of 'extracting' important frames of video data and using them as photographs in her research. She made the point that transcriptions can unintentionally 'take out' important factors such as gesture, facial expression, bodily presence, and pauses. However, photographs extracted from the original digital video data can be useful in providing the reader with some of this valuable information in conjunction with text-based transcriptions.

In our study, we used video in some of the ways described above. For example, we used digital video data for triangulation with other data sources, we extracted still photographs from the raw video and we constructed

multimedia documents to report on our research. The next sections describe our use of digital video as a research tool and raise pertinent issues that have surrounded this use. These issues mainly concerned data collection and presentation using digital video.

## **Digital Video as a Research Tool in This Study**

### **Methodology**

In each case study from our project, permission was obtained from the school, the relevant education authority, teachers, parents and students to video the lessons observed, and to use data collected in this way in our analysis of the study. The researchers also promised to maintain confidentiality of the students and other participants, and gave assurances that images of students or teachers would not be shown in any publications on the research.

The research team, comprising the authors as principal researchers and two highly experienced research assistants, visited schools in pairs. As well as data collected through the use of questionnaires, interviews and focus groups, lessons related to the classes' use of digital video were observed. Observations were based on an observation schedule the team had developed, but also focused on any interesting activities in which the students were engaged. One member of the team filmed the student activity and general classroom environment, while the other member of the team made field notes according to the observation schedule and supplemented these with relevant observations that had not been captured by the schedule. This way of using video for data collection is supported by Bogdan and Biklen (1998) who recommend a collaboration of researchers in the field to supplement video data with participant observation and field notes. They believe that film "isolates and freezes relationships or behaviours in a way that cannot be created verbally; but a human observer can give a sense of the entire fabric of events that cannot be conveyed photographically" (p. 103). Goldman-Segall (1990) supports this view: "...I cannot observe, participate in meaningful conversations, write notes, notice a full range of ambience in the environment, and reflect upon it – all at the same time" (p. 234). Additionally, examples of student-generated video produced by the classes were provided to the researchers on CD or DVD, with permission to use in the study.

After the field trips for each case study were completed, the researchers who had been involved in the data collection at that school transcribed the data from notes, audio tapes, and video tapes. These transcriptions were sent to all members of the team who had been researchers on that case study, for verification. In the case of disagreement, the researchers revisited the raw data on the audio and video tapes. After all data from a case had been transcribed, a member of the research team took responsibility for writing up the case study. The case studies followed a template that the principal researchers had developed to capture the case of the first school visited. The template considered the data and categorised the findings into a number of areas that had been suggested by the research questions for the study. Additional discussion occurred as appropriate. Finally, a member of the research team went through the digital video tapes and used editing software to compile a set of relevant clips as a library of illustrative video. He then went through the case and linked selected clips to sections of the report so that the researchers would have examples and illustrations of various phenomena described textually in the report.

The next stage after all the case studies were complete, was to collaboratively consider the five cases and look for common trends, discrete differences and influences that might have caused these differences. A final summative report was prepared on the study as a whole. As well as this report, to be shared with the funding bodies, reports were also sent to each school and to the major employing authority of the case schools under its administration, and papers were written and disseminated. At time of writing, the research was in this last stage, which will be completed by the time of the presentation.

### **Ways in which Digital Video Was Used as a Research Tool in The Project**

As can be seen from the description of methodology above, the researchers used digital video in a number of ways in the research process. Firstly, it was used to collect data in classrooms to supplement the data collected in observation. Students were filmed working collaboratively at computers editing their films, they were filmed in the playgrounds when they were shooting video and examples of their work were filmed as they demonstrated these to the research team. In the analysis stage of the research, digital video was used to confirm or refute findings that researchers had tentatively proposed. Video was also used in cases where researchers disagreed about a finding.

Students' digital video artefacts were also used to inform analysis. Finally, the findings of the study were illustrated clearly by sequences from the video footage collected and this footage greatly enhanced the presentation and dissemination process.

As the research team worked with digital video as a research tool, it became apparent that there were a number of areas in which issues arose as a direct result of this use. These are discussed in the next section.

## **Issues Arising From The Use of Digital Video as a Research Tool in This Study**

A number of methodological and ethical issues emerged as we collected and analysed our video-based data and used it to disseminate findings. These issues arose in two main areas of the research process, the data collection stage and the dissemination and presentation stage. Consequently, these are the two areas which are discussed below. Some of these issues have been discussed in the literature, so the following accounts are not meant to provide a panacea for related problems but rather, extend the boundaries of discussion.

### **Data Collection Issues**

#### ***Choosing What to Film and Edit: Subjectivity Issues***

Collecting and analysing video-based data is prone to the same issue of subjectivity as selection and analysis of non-video-based data, both when collecting the data and when analysing them. For example, decisions about what to record and how to record it are not neutral. To address this issue, Mousley (1998) suggests the need to discuss the selection process itself in the research whilst Goldman-Segall (1990) suggests that interpretive researchers need to tread carefully between what may be labelled as 'bias' reporting and their own interpretations. Indeed, she makes the point that too much educational research in the past has tried to avoid a personal, subjective and interpretive approach and video-based data cannot be without a point of view: "... video ethnography is the ethnographer's perspective of what takes place in front of the camera when the camera is turned on" (p. 29). As a result, the reader "is put in a role that requires active engagement with the evidence and critical attention to its shortcomings and bias ... " (Walker 2002, p. 120).

Discussion amongst research team members about what we should film, both before and during filming, was valuable. Before filming, the research team had a shared understanding of what they were investigating so that the researcher who was filming was able to capture material relevant to the study. While at a case school, the filmer often consulted with the other researcher in the classroom to gain agreement about what should be filmed. We also ensured that the whole team worked on the initial case and collectively shared their reasons for choosing to film certain incidents or events. This process helped to make the data collection more transparent to the whole team.

Selection of classroom events from the raw video data for representation, analysis and writing up involves a series of value judgments. This includes any decisions on what video frames might make suitable photographs (see previous section for details on how we used this technique) and how much of these photographs need to be edited (eg. how much background to 'crop' from a photo). Mousley (1998) cautions that "... the greater the reduction (the more that the result is decontextualised over area and time), the greater the potential for biased choice." (p. 402)

Of equal concern were the possible factors that may influence the selection decision, such as clarity of the video, evocativeness of the incident, confidentiality issues (are children's faces clearly visible and identifiable), and the researcher's interests and biases. In some cases, the decision, therefore, to include a video clip may not be because it will enrich the understanding of the case, but rather because it is expedient to include it. In this study, we were aware of this potential bias and selection of video-based data was done collaboratively by the research team so that consensus was reached on what was kept and what was discarded in the analysis and dissemination of results.

### **Changing The Research Environment – Authenticity Issues**

#### ***Impact of Filming on Participants and Learning Environment***

Although video is often associated with a naturalistic approach to data collection, the presence of a video camera inevitably intrudes on the 'natural' environment being studied. Bogdan and Biklen (1998) note that the

presence of an observer changes any setting to be observed, however, a photographer or filmer can change it in more noticeable ways. For instance, a researcher may need to ask a class to minimize background noise levels and other distractions relating to the filming of participants. We were very aware as we conducted the study that many of the teachers in the classes we visited, had gone to great lengths to ensure that we could have access to lessons using student-generated video. This often meant that the research situation had changed to achieve the goals of the research, that is, the research was influencing the researched. Further, bringing video cameras into classrooms usually gained some attention from the students, who often behaved differently for the camera than they might have had we just been observers sitting in the classroom.

This problem can be minimized though. Bogdan and Biklen note that the novelty of a filmer in the classroom can quickly disappear after a short time. However, this '*extinction time*' needs to be considered in a study's design and enough time must be allowed for it. Participants should also be informed of the nature and purpose of the filming to help them 'act naturally' and avoid distraction. Indeed, in our study, we asked the classroom teacher to introduce us and explain why we were there and often the teacher would give us the opportunity to tell the students something about the research and what we intended to do. Also, the students in our study were using cameras and video editing software themselves and so the novelty of seeing us filming in their classroom (and the subsequent '*extinction time*') was significantly reduced.

### ***Impact of Film Editing on Data***

A well-discussed and obvious affordance of digital video-based data is its malleable nature—it can be easily edited and re-presented in a multimedia document. However, the extent to which such editing changes the original meaning of the raw data is problematic. Pea (1999) mentions this limitation: “An ... issue is the integrity of video data that are being reported, where the concern is time sequence or time compression alterations distorting ‘the way it was’”(p. 353). A scene filmed in one of our case studies recorded two children arguing at the keyboard of a computer and captured the students pulling and pushing each other's hands away from the keyboard. The two children were from different racial backgrounds and the final scene beautifully captured the dark-pigmented hand of one child over the white-pigmented hand of her partner. This image was the final frame of the selected clip and conveyed quite a powerful image of inter-racial harmony, implying that the two students had reconciled their differences. In fact this was not the case but only the researcher who observed this incident was aware that the differences still existed; the other researchers interpreted the video clip of the incident as one ending in reconciliation between the students. Hence the presence of a clip illustrating a seemingly poignant moment, without providing information about the pressure that the one hand was exerting on the other, led to misinterpretations by some of the researchers. Williams and Clarke (2002) report on similar misleading representations from the video data.

On numerous occasions we worked with a relevant section of raw video footage and selected a series of shorter but pertinent clips from this recording. The irrelevant material 'between' these clips was deleted and the remaining clips were 'stitched' together by transition effects that effectively acted as '*video ellipses*' in our multimedia document reports. (Indeed, the particular type of video transition chosen for this 'ellipses' effect was repeated throughout the research report to provide consistency.) However, as in the equivalent text situation where a quotation is edited and ellipses are inserted to replace certain words, this video editing possibly changed the original meaning and context of the original unedited footage.

### **Dissemination and Presentation Issues**

#### ***Concealing Identities: Confidentiality Issues***

A major constraint in the use of digital video in qualitative educational research is that of confidentiality. While addition of video clips to papers and reports undoubtedly enriches the cases, as researchers we were ethically bound to keep identities confidential. This constraint meant that if we wished to use a clip in which children could be clearly identified, we had to disguise the identity of their faces. We used digital video editing software in two main ways to preserve anonymity. Firstly, we used 'masking' effects on video shots of students' faces, to conceal their identities. Secondly, where there were too many faces to conceal, we extracted a digital photograph from an appropriate scene in the relevant video clip in which the activities rather than the students' identities were visible. We then used the editing software to extract associated audio (eg. a learning conversation) from the same footage to

present as a supplement to the photograph and surrounding text. This use of digital photographs and digital audio data gets around the issues of confidentiality but still makes available much of the rich data available in the audio (eg. expression and tones of voices, general ambience of environment etc.). A small issue that has emerged here is the need to provide text which relates the voices in the audio recording to the context shown in the associated photograph. We have also inserted audio annotations to clarify incidents in which we extracted audio clips but could not use the corresponding visual clips for confidentiality reasons.

Given that the purpose of the video clip is to share the data from the case with the reader in as realistic a way as possible, the masking of faces or extraction of appropriate digital photographs or audio data is a limitation to this use of video and possibly presents a distraction to the reader/viewer. Hence, as we became aware of the difficulties of portraying faces in a convincing manner using the above techniques, we changed some data collection techniques using the video camera. We concentrated on getting video footage of the activity, rather than the students, and if students were included, we tried to film them from behind so that they could not be identified. This way of filming has allowed us to present video clips in our dissemination in a way that is more faithful to the case.

### ***Collected Student Documents in Digital Video Format: Ownership Issues***

Another issue that we wish to raise is that of ownership of student-generated digital video-based documents that were collected as a data source in this study. Often the teachers would provide us with CDs or DVDs of the students' work using digital video. These artefacts were very useful in demonstrating how the video had been created by students for their learning. Accordingly, it was desirable to use some of these examples by extracting clips from them to include in our multimedia-based research reports. However, an issue of our right to use material that has been generated by students, with the support or leadership of their teachers, arises. The intellectual property belonged to the class or school from which it came, and we were not able to attribute it to the producers because of the need for confidentiality. Our solution to this problem was to show only a very small segment of such artefacts, in our papers and presentations. However, as with the edited researcher video clips (see previous section), cut-down, edited versions of these student artefacts may have changed the intended meaning of the original collected documents.

## **Implications and Conclusion**

In this study, selected video clips were added to the case studies that illustrated various findings in evocative, compelling and succinct ways. The clips clarified points of discussion, brought the cases to life and enhanced understanding of the results. However, methodological and ethical matters relating to the use of digital video as a research tool emerged during our study and warrant further discussion. These matters include issues of confidentiality, subjectivity, authenticity and ownership. In some ways, the increasingly malleable nature of digital video-based data is changing the landscape of these issues and pointing to the need for greater development of skills in critically "reading" multimedia-based research.

The ease of editing video-based data presents both benefits and problems for researchers. For example, the increasing number of ways to use video editing software to conceal students' identities is helping to solve the issue of confidentiality when using video data. Ways of extracting appropriate photographs and associated audio to present in a multimedia document have been discussed here. However, edited video data may be misinterpreted in a way that is not congruent with the original meaning of the raw footage. This authenticity problem also applies to video-based collected documents that are edited for inclusion in research analysis and reporting. Indeed, the selection and editing of these clips (or other digital media extracted from the raw digital video) can involve highly subjective judgements and these processes need to be both discussed thoroughly and made transparent by researchers.

Despite advances in the ease and cost of using digital video to enhance data collection and analysis, interpretation, description and dissemination of qualitative studies, issues relating to the use of digital video as a research tool need further explication and debate. Further, although the issues discussed here are paralleled in text-based discussion of research, the richness of video data makes the evidence seem seductively real and compelling and can lead the reader to suspend critical judgement more easily than in text-based cases. Researchers who have experience using video tools in the field could usefully contribute to this debate.

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