

TAKING VIDEO CAMERAS INTO THE CLASSROOM

KATHRIN OTREL-CASS, BRONWEN COWIE AND MICHAEL MAGUIRE

*Faculty of Education
The University of Waikato*

ABSTRACT *Research into the communication and interactions in classrooms need to take the multimodal nature of classrooms into account. Video cameras can capture the dynamics of teaching and learning, but the use of videos for research purposes needs to be well thought through in order to accommodate the challenges this tool holds. This article refers to three research projects where videos were used to generate data. It is argued that videos allow the researcher to hone in on the micro-details and, in contrast to other data generation tools, allows researchers who were not present at the time to view what has been witnessed. A video recording is a data source but not data by itself and the information that is discerned from a video is framed and shaped by the research paradigm and the questions asked.*

KEY WORDS:

Classroom research, multimodal, video camera, video analysis

INTRODUCTION

Research methods investigating human interactions have seen an increase in the use of new and mobile technologies in recent years. Often this has something to do with the aim to capture the experiences of the research participants in context (Mulder & Kort, 2008). For this reason visual records like photos and videos have increased in attractiveness as research methods, since they can capture thick and lasting records of what has been witnessed (Holm, 2008). Classrooms are places where communication and interactions are of a multimodal nature and where teachers provide multiple opportunities for their students to articulate, explore and experience ideas. Multimodality infers that communication is not just talk, but rather the result of social practices that are materially, socially and culturally shaped (Jewitt, 2006). Research that is concerned with classroom interactions therefore needs to take the multimodal nature of classrooms into account. The use of the video camera to capture teaching and learning has the advantage of encapsulating and preserving a detailed representation of the dynamics of complex interactions that is then available for in-depth analysis (Jacobs, Hollingsworth & Givvin, 2007). The recording of events in real time using videos affords later microanalysis moment by moment. The practice of re-examination of a visual record allows for new methods of analysis to be used. Watching videotapes of teachers and students when they are working together can provide a great deal of information. However, videos are not simple representations of reality but are shaped by the researcher

who takes them (Jewitt, 2006). Issues such as trustworthiness and explicitness in design, recording and reporting of video data are needed to ensure the robustness of video-based research.

In this article, we refer to our own experiences of videoing in classrooms. The projects that are referred to are the InSiTE study (Cowie, Moreland, Jones, & Otrell-Cass, 2008), which focused on teacher–student interactions around science and technology ideas, the Furnware study (Harlow, Maguire, & Jones, 2008), which investigated student use of classroom equipment, and the Science Learning Hub project (Otrell-Cass, Cowie, & Fester, 2008), which explored the use of a website.

VIDEO RESEARCH IN SUPPORT OF THE THEORETICAL FRAMEWORK AND THE RESEARCH QUESTIONS

Video offers researchers the opportunity to capture dynamic in situ records of interaction. When videos are used they can tell stories and help us to understand what happened to the participants at the time of filming in a way that “looks beyond language” (Jewitt, 2006, p. 16). Video “can help people see things they did not see before” (Schwartz & Hartman, 2007, p. 337) because micro-details are often lost when you are emerged in a setting for the first time. It offers the promise of encapsulating the subtle interchanges between actors and their tools that may be too ephemeral to capture otherwise. It is a very attractive idea that the video camera can encapsulate everything when in fact the camera only captures what is within the frame of the lens, as this lens has been positioned by the researcher (Holm, 2008). Decisions about the positioning and focusing of the camera need to be guided by the theoretical framework and the research questions because these determine the type of data that is needed. That is these inform “what” and “how” information is selected, framed and recorded. They also inform the analysis process. The placement and focus of the video camera as a data generation tool is all the more important because video captures, and therefore has the potential to exclude, an enormous amount of information, something which can be both an advantage and challenge. This said, classrooms come in all shapes and sizes. Sometimes the positioning of a camera is determined as much by space or light restrictions as by the research agenda. To illustrate some of these points we now turn to our research projects.

THE VIDEO CAMERA IN CLASSROOMS

The Furnware project was designed to investigate the impact of a different style of classroom furniture called Bodyfurn® when introduced into the classroom environment. This comparative study used teacher and student interviews, student questionnaires, and classroom observation notes supported by video to record any changes in student behaviour, which may later be found to be attributable to the new furniture when measured against student behaviour when they used their existing furniture (Harlow, Maguire, & Jones, 2008). The researchers used two video cameras to record students; one camera captured video of the whole class to provide the context for the other camera, which captured the actions of a group of four to six students. They later viewed the video of this focus group and correlated

it against the time-coded observational notes. This assisted the research team in making decisions about the codes to be used to make judgements about student behaviour. The classroom video, in combination with observational notes, was also viewed to check if there were influences on student actions beyond the focus video frame, and they were noted.

In deciding on the location and focus of the video cameras the Furnware project researchers found it useful to begin by familiarising themselves with the various settings they would be researching. Recording in each of the four classrooms was preceded by a period in the classroom when they trialled locating the video cameras in a position that would minimise the impact of the researchers and the video equipment on the classroom environment, and also optimise access to the relevant data. This decision about the placement of the cameras was directly related to the research question, which required the team to be able to compare videos that were recorded over two contrasting periods. For this reason, it was imperative that the video camera sighting the student focus group be in a fixed position, so that the video included a full view of students sitting at their desks and enough space around them so that any movement in/out of their chairs was recorded.

Another example of the close relationship between the research questions and how the video camera is directed comes from a user-experience research project that was looking at how students used an Internet-based resource: the Science Learning Hub project (Otrell-Cass, Cowie & Fester, 2008). This study was designed to better understand the complex relationship and interactions between Internet-based lesson materials, teachers and students in the classroom. Rather than proving or disproving a theoretical standpoint, this study explored the nature of the interactions when students were using the Internet-based resource, guided by their teachers. The research project also aimed to understand the students' and teacher's experiences. Studying experiences takes time (Mulder & Kort, 2008) so this study recorded students using the Science Learning Hub over a period of at least a week. The research questions guided the planning of the data gathering process. Specifically, the data needed had to include instances where the Internet resource was being used. Drawing on previous research on classroom activities using the Internet, process videos were utilised to capture interactions (Wallace, 2004). Process videos refer to the practice of filming participants while they are using computers. In the Hub study, a camera was mounted behind a pair of children to capture the screen and student interactions with the screen-based materials. This perspective allowed the study of students' meaning-making processes, responses and use of the resource in the natural setting (Lemke, 2007).

Students quickly became comfortable with and ignored the video camera. The video footage provided an insight into the students' actions in using the various materials on the Hub, which included amongst others, resources about ecosystems in Antarctica. Combined with audio recording, it was possible to capture the talk between the children as they worked as a group or talked with their teacher. The process videos were used to quantify the different student activities as they engaged with the Hub material. Through the videos it was possible to track and count frequencies of certain types of behaviours such as pointing to particular text and

images, and at the same time generate qualifying descriptors that added depth, like descriptions of the task the students were given, conversations between students or gestures by the students when they were talking about something with their partner and negotiating their views. The video captured how the children navigated and worked through the computer-based activities. In-class observations were compared with the teacher's plans and student work that was produced. During the analysis of the process videos, a coding system was developed that focused on what could be observed of the children working on their computers. Coded process videos were compared with observational notes, notes from teacher planning, student work and structured and unstructured discussions with the participants. While the use of the process videos followed the guiding research focus it was still possible to be open to the unexpected and, by using videos, it was possible to revisit particular instances that were of interest.

LINKING VIDEOS WITH OTHER METHODS OF DATA GENERATION

The data gathering techniques selected for research delimits the data generated and consequently the information and findings that can be produced (Mestre, 2000). Videoed material provides rich sources of data, but is not data on its own (Erickson, 2007). Data can be constructed from videotapes and shared amongst the research group for further analysis. Relying on what has been captured on video alone can restrict what can be learned. Interactions in the classrooms happen through a range of modes such as talk, facial expressions and body movements and are mediated through material, social and cultural resources. A video recording of students and their teachers while they are working in the classroom can be compromised by the environment, for example, by being noisy or of limited lighting. Using a range of methods for data generation in support of video records provides multiple avenues, which, individually, offer different insights into the same phenomena and provide levels of robustness to the research. Visual, audio and written data may include audio and video recordings, observational notes, research diaries, interviews, document collection, conversations and interviews (Flewitt, 2006). To generate a richer picture of what happens in the classrooms it can be also useful to use two video cameras, as was done in the Furnware and Science Learning Hub projects described above. The InSiTE project used one and occasionally two video cameras.

The InSiTE project was a three-year long-term study of teacher and student classroom interactions around the ideas of science and technology. Over the three-year period the team of researchers worked with 12 teachers and their classes. The study was grounded in a sociocultural theoretical frame. Over the course of the study the researchers came to pay greater attention to the multimodal nature of interaction that encompasses how talk or other means of communication are mediated through other people and resources. Data was generated through two main forms—classroom observation of teaching and learning units, and teacher and researcher team meetings. The research team employed a number of data collection methods to generate and record data on the teaching and learning interactions, including digital video of teacher interactions with students. One video was dedicated to following the teacher. When it was available a second video was used

to record small group interactions. Video recordings were supported through digitally audio-taping the talk of selected participants and most times digital photo cameras were used as well. All these tools were used to capture examples of work or typical phenomena. To supplement video and audio recordings and to record emerging themes, observational notes were taken during the filming in class. Careful note taking while recording with a video camera can provide an alternative insight into what is happening since details can be noted that are outside the view of the video (Lesh & Lehrer, 2000). Observational notes can highlight particular events and times, which can later easily be identified on the video recordings for re-viewing allowing the microanalysis of certain episodes of importance (Erickson, 2007). In the InSiTE study these notes were crucial as a first layer of analysis because they identified what the researchers felt to be important based on their understandings of the theory and research questions. Because two researchers were taking notes, discussing differences in what was noted provided a rich opportunity for challenging and probing what had happened and associated ideas and interpretations. Interviews and documentary background materials like teaching plans provided yet another and different insight contributing to a wider understanding of the context of the classroom and the interactions that had been observed. The combination of these different types of data provided for triangulation across the modes of data collection and the data collected by different researchers and contributed to a more focused and multilevel analysis.

VIDEOTAPE ANALYSES

Simply making a video does not guarantee easy access to understanding. The video analysis process depends on a researcher's theoretical commitment, the research questions and any time constraints on the study (Barron & Engle, 2007). Reflections on the theory that underpinned the research focus were fundamental in all of the three studies and allowed the researchers to chunk the video data. By this we mean the thematical grouping of data to do with, for instance, a particular type of classroom interaction. Following this process we were able to focus our attention on selected instances whilst keeping the multimodal character of learning in mind. The analysis process was one where researchers reflected on the events and interactions that had been witnessed while in the classroom. This process of continually and consciously making and building sense was helped by viewing and re-viewing the video that had been captured in the classroom. In the three research projects it was often in this early stage of analysis that research questions were refined. By chunking and thematically analysing selected events the analysis process was led to the next level. The big advantage of using video was that it allowed zooming in on selected instances to probe at the micro level, thus enabling us to add layers of complexity (Goldman & McDermott, 2007). In addition, in the three projects selected episodes in the video records were coded, which allowed a systematic approach of analysis. It was useful to start the coding in a simple way, by identifying the bigger themes, and not to make things too complicated. In the process of the analyses, the coding involved several cycles of viewing the video material during which it was possible to superimpose further layers of detail. The

coding systems that were developed and adopted were different for each project and reflective of the research questions. In the following some examples are described to illustrate how the analysis of videotape recordings was conducted.

In the Furnware project (Harlow, Maguire, & Jones, 2008), the researchers met after each observation period and discussed the tentative findings, which were informed by the time-coded observation notes. The immediacy of this analysis experience was important and helped discipline “researcher talk” because it focused around recently seen and often newly discovered actions and idiosyncrasies in how the students used their desks and chairs. Over the period of the research, these meetings helped develop a deeper understanding of what the researcher had “seen”.

In the Science Learning Hub research project (Otrell-Cass, Cowie, & Fester 2008), part of the analysis process was to code process videos on pre-selected modes such as students searching the Internet or viewing online videos. These were developed from the descriptions of the methods of Wallace (2004), who examined the challenges of teaching with the Internet and found these included reading, searching and looking at multimedia. Rather than counting the frequency of these occurrences in each lesson, frequencies from several lessons were compared to identify overall trends. This process allowed the research team to trace changes of student behaviour and usage of the Internet over several days. The coded lessons were then further compared with the teacher lesson plans, the social organisation of student (i.e. whether the students were working as pairs or in groups) and observational notes in order to make sense and better understand how and why students were using the Internet resources.

In the InSiTE study (Cowie, Moreland, Jones & Otrell-Cass, 2008), a video camera followed the teachers to capture their interactions with students. The core of the analysis process then involved a close analysis of these, keeping in mind the kinds of interactions that were expected to occur. In one classroom students were learning about classification systems. To facilitate this the teacher used a wall display in her daily interactions. The students played an “odd one out” game during and outside class time, which involved them selecting four animals, one of which did not belong in the same family. Over time the children became very adept at playing this game with each other, often independent of teacher help. Coding in this case identified locations of the teacher in the classroom in relationship to her class and took the nature of the artefacts supporting interaction into account. The analysis zoomed in on how the wall display and its component pictures and word labels were manipulated and used by students and the teacher to make and communicate meaning. Analysing the video material enriched descriptive accounts of interactional phenomena, allowing for the inclusion of aspects of body posture, spatial location and orientation and tone of voice in addition to the content of talk. After the InSiTE classroom observations, the researchers would typically talk to teachers, students and later to each other to identify and note specific events of particular interest to investigate further within a video. Observational notes often included time sequence notes to help researchers identify where to look at again on the video. Identifying themes was a first step in the analysis process. Also, the practice of two researchers doing observations, comparisons and then honing in on

a moment of interest on the video gave the opportunity to compare, highlight and expand existing understanding of interactions in science classrooms.

In each of the three projects the video material was coded using the analytical coding software program Studicode. This program enabled the research teams to view the video with an attached timeline into which codes were inserted. The codes that were developed were related to the analytical focus, so, for example, the InSiTE videos were coded by “tagging” episodes of teacher talk to the whole class, a group of students or an individual student. During a refamiliarisation period with the videos, the videos were simultaneously played and compared with time-coded observational notes. At this time, note was taken of any additional significant actions by students or teachers. This process helped to refine and then decide on the codes with which to analyse the video further. In our experience when and to what extent a coding software should be used or not, is dependent on the research design and the focus of a particular research project.

Ideally, the research design should be set up to allow several levels and cycles of coding and analysis (Lesh & Lehrer, 2000). Research projects may involve the analysis of data derived from qualitative and/or quantitative methodologies. The analysis of video “... can serve complementary functions: qualitative research can be used to generate new questions and theories, which are then tested through quantitative means and then later revised or expanded through further qualitative research, and so on” (Jacobs, Kawanaka, & Stigler, 1999, p. 718). Video, unlike paper-based recordings, allows the researcher to re-examine layers of complexity (Goldman & McDermott, 2007). This way of analysis is very different, however, from systematic coding where the aim is to establish meaningful codes based on what is known from the literature and what can be observed in the classroom. As a starting point for this type of analysis, it is important to identify first the focus of the research and then hone in on a more detailed focus that becomes pertinent in a specific example.

THE EFFECTS OF FILMING IN CLASSROOMS—ETHICAL IMPERATIVES

Any research involving people requires that researchers ask participants for specific informed consent if they intend to capture their images or voices. While classrooms are both public and private spaces, it is important to seek the consent of the school principal, teachers, students and their parents when conducting research, all the more so with the use of video. The use of video footage of students and teachers needs special consideration in terms of who is/who is not to view this resource because it displays student actions in rich detail. As Briggs and Coleman (2007, citing the works of the United Nations, 1989, and Glenn, 2000) make clear, researchers “... view of ethics [must] ... reflect the individuality and autonomy of the researched, for whom the researchers have a duty of care ”(p.107). Roschelle (2000, p. 726) suggests keeping three issues in mind when asking participants for consent

- Can participants freely decide whether they want to participate in the recording or not?

- Do the participants understand how the videotapes will be used?
- Do the participants have the right to request that the tapes be destroyed after the research is complete?

Before entering classrooms parents, teachers and communities had to be fully informed in writing so to provide them with the opportunity to safeguard their children, something that is particularly important when the research involves very young participants. This protection of individuals would be guaranteed by, for example, ensuring the participants' parents/caregivers that children would not be identified in any published materials and a guarantee that "... information collected, including the videos, will only be seen by the researchers and then stored securely" (Harlow, Maguire, & Jones, 2008, Appendix C: Letter to Parents/Caregivers). In some cases, parents had requested to exclude their children from being videoed and in these circumstances we deliberately refrained from filming these children or involving them in any of our recordings.

In our experience children were usually not particularly intimidated by the presence of video cameras in the classroom. In fact, perhaps given society's proclivity towards video technology, students were generally very interested in having a look at what had been filmed. They were usually very accommodating to the researchers fully capturing their activities so that, in our experience, the use of a video camera did not appear to cause much disturbance to classroom routines.

Any image of a person, whether it is the teacher or the student, is owned by that person and, if it had been seen as a useful addition to illustrate the reporting through still frames, specific permission would have had to have been sought. We protected the confidentiality of our participants by adhering to the above commitment and also by not releasing personal information such as the names of schools, teachers and students. Teachers and students knew that only we, the researchers, were watching the videos although in some cases, where the focus of the research was on teaching and the resulting interactions, teachers were invited to watch their videos together with the researchers as part of the analysis process. However, we felt it unnecessary to use video material for illustration purposes in any presentations to third parties or at conferences, in order to protect our participants.

CONCLUSIONS

Using videos to collect data in classrooms can allow for a more detailed and in-depth analysis of the complex and multimodal interactions that take place in classrooms. Videos can be used in combination with other visual, audio and or written data in order provide a richer data set and interpretive account of educational practices, an account that is trustworthy and robust. The use of videos in classroom research can range from an approach that is open to the unexpected to a very closed and defined approach that investigates a question with predetermined criteria. In either event much thought needs to be put into how to use this method of data generation in order to make the best use of it. Videos, combined with more traditional data gathering tools, allow researchers to take a look at specific examples in more detail. Because videos preserve the moment in considerable detail

it is possible to share them with each other and teachers to negotiate meaning as part of the research process. The research design plan and the classroom set-up are equally salient issues to consider as is the impact of the researchers' presence in the classrooms. It is also important to consider the research questions and longer-term goals in order to think about and plan for the coding and analysis of the micro detail of the observed.

REFERENCES

- Barron, B., & Engle, R.A. (2007). Analyzing data derived from video records. In J. Derry (Ed.), *Guidelines for video research in education: Recommendations from an expert panel* (pp. 24–33). Madison, WI: University of Wisconsin-Madison. Retrieved from <http://drdc.uchicago.edu/what/video-research-guidelines.pdf>
- Briggs, A., & Coleman, M. (Eds.). (2007). *Research methods in educational leadership and management* (2nd ed.). Los Angeles, CA: Sage.
- Cowie, B., Moreland, J., Jones, A., & Otrell-Cass, K. (2008). *The classroom InSiTE project: Understanding classroom interactions to enhance teaching and learning in Years 1–8. Final report*. Wellington, New Zealand: Teaching and Learning Research Initiative (TLRI).
- Erickson, F. (2007). Ways of seeing video: Toward a phenomenology of viewing minimally edited footage. In R. Goldman, R. Pea, & B. Barron (Eds.), *Video research in the learning sciences*. Mahwah, NJ: Erlbaum.
- Flewitt, R. (2006). Using video to investigate preschool classroom interaction: Education research assumptions and methodological practices. *Visual Communications*, 5(25), 25–50. doi: 10.1177/1470357206060917
- Goldman, S., & McDermott, R. (2007). Staying the course with video analysis. In R. Goldman, R. Pea, B. Barron & S. J. Derry (Eds.), *Video Research in the learning sciences* (pp. 101–114). Mahwah, NJ: Erlbaum.
- Harlow, A., Maguire, M., & Jones, A. (2008). *Study of the impact of Furniture classroom furniture on classroom learning environments*. Draft final report.
- Holm, G. (2008). Visual research methods: Where are we and where are we going. In S. N. Hesse-Biber, & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 325–341). New York, NY: Guilford Press.
- Jacobs, J. K., Hollingsworth, H., & Givvin K. B. (2007). Video-based research made 'easy': Methodological lessons learned from the TIMSS video studies. *Field Method*, 19(3), 284–299. doi: 10.1177/1525822X073022007
- Jacobs, J. K., Kawanaka, T., & Stigler, J. W. (1999). Integrating qualitative and quantitative approaches to the analysis of video data on classroom teaching. *International Journal of Educational Research*, 31(8), 717–724. doi:10.1016/S0883-0355(99)00036-1
- Jewitt, C. (2006). *Technology, literacy and learning: A multimodal approach*. New York, NY: Routledge.
- Lemke, J. (2007). Video epistemology in-and-outside the box: Traversing attentional spaces. In R. Goldman, R. Pea, B. Barron & S. J. Derry (Eds.), *Video research in the learning sciences* (pp. 39–51). Mahwah, NJ: Erlbaum.

- Lesh, R., & Lehrer, R. (2000). Iterative refinement cycles for videotape analyses of conceptual change. In A. E. Kelly & R. A. Lesh (Eds.), *Handbook of research design in mathematics and science education* (pp. 665–708). Mahwah, NJ: Erlbaum.
- Mestre, J. P. (2000). Progress in research: The interplay among theory, research questions, and measurement techniques. In A. E. Kelly & R. A. Lesh (Eds.), *Handbook of research design in mathematics and science education* (pp. 151–168). Mahwah, NJ: Erlbaum.
- Mulder, I., & Kort, J. (2008). Mixed emotions, mixed methods: The role of emergent technologies in studying user experience in context. In S. N. Hesse-Biber & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 601–612). New York, NY: Guilford Press.
- Otrell-Cass, K., Cowie, B., & Fester, V. (2008, April). The Science Learning Hub in action in the classroom. *Paper presented at the 7th Science Education Research Symposium (SERS)*, Wellington, New Zealand.
- Roschelle, J. (2000). Choosing and using video equipment for data collection. In A. E. Kelly & R. A. Lesh (Eds.), *Handbook of research design in mathematics and science education* (pp. 709–731). Mahwah, NJ: Erlbaum.
- Schwartz, D. L., & Hartman, K. (2007). It's not television any more: Designing digital video for learning and assessment. In R. Goldman, R. Pea, B. Barron, & S. J. Derry (Eds.), *Video research in the learning sciences* (pp. 335–348). Mahwah, NJ: Erlbaum.
- Wallace, R. M. (2004). A framework for understanding teaching with the internet. *American Educational Research Journal*, 41(2), 447–488.
doi:10.3102/00028312041002447

Copyright of Waikato Journal of Education is the property of Waikato Journal of Education and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.