Moffitt, P. & Bligh, B. (in press). Video and the pedagogy of expansive learning. To appear in D.S.P. Gedera & A. Zalipour (Eds.), *Video Pedagogy: Theory and Practice*. Springer. (Due 2021).

Video and the pedagogy of expansive learning

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Abstract

This chapter explores the use of video footage for purposes which are simultaneously focused toward emancipation and learning. Video footage is conceptualised by the authors as a mediating artefact—it sits between a person or group of people (as the subject of activity) and their developmental intent (as the object of activity). To illustrate the pedagogical potential of video footage in higher education, the authors re-analyse data which was captured during a larger underlying project. This underlying project made extensive use of video footage to provoke change in a higher education institution by encouraging students, lecturers and managers to focus on their developing agency. The authors contend that video can inform learning as an unfolding process; they emphasise how video footage was used in different ways, by different participants, at different moments throughout their research-intervention. Their examples illustrate how people can challenge their daily realities with video footage, using it to inform affective relationships and to play developmental roles in their shaping of pedagogical processes.

Introduction

Consider three examples of video use in higher education. Undergraduate mechanical and electrical engineers experiment with water pumps in lab-groups, recording footage of their own labour to aid in developing their diagnostic technique; during visits to regional wastewater treatment sites, they create diary videos, exposing problematic aspects of their learning activity to themselves and others; and later, while on industrial placements, they record and analyse footage of vocational practices that deviate from curriculum content, which they share online for discussion in their cohorts. Even considered individually, each of these actions has considerable merit: those who generate and analyse the video footage, in each case, use it—through performance analysis, reflection, or group critique, respectively—as a means for developing their practice. Yet such a fragmentary conception seems strangely limiting. Might there not be a wider potential for conceptualising video-mediated educational practices as moments within an ongoing trajectory of learning—linking together different practices within an overarching strategy, and thereby opening up a more radical potential

for shaping pedagogical processes? It is towards this question, and the illustration of one such pedagogical strategy and the roles played video within it, that the present chapter is oriented.

In recent years, examples of the kind we suggest above—even where considered as isolated or fragmentary actions—have helped challenge, in the educational research literature, a longstanding view of video as an object of 'detached', replicable analysis (Ip & Morrison, 2001; Xiao & Mackenzie, 2004). Video is instead increasingly positioned, within both research scholarship and pedagogical praxis, in ways that go "beyond representation … to evoke, to communicate multimodally in a sensuous way, and to affect viewers" (Vannini, 2015, p. 231). Teachers use recordings in professional development programmes, to reflect on 'critical incidents' within classroom interaction footage (Rozario & Ortlieb, 2015). Online sharing allows discussion of pedagogical implications across practitioner-research communities (Pea & Hoffert, 2007). Meanwhile, as our opening examples highlight, students take advantage of lower barriers to digital video-production: incorporating video into their learning practices as a means for peer-dialogue, collaboration and even societal activism (Holmes, Anastopoulou, Schaumburg & Mavrikis, 2018).

Across this broad range of examples, the importance of video is located in its function as a *mediating artefact*: the *people* using video, *how* they use it and what they use it *for* are closely woven together. Appreciating that close relationship is important and underpins our approach in this chapter, which contrasts with a more common impulse to focus more narrowly on intrinsic or technological 'properties' and attendant opportunities for novel 'uses' of video. Considering video mediationally allows us to notice that, in the literature, impressive methodological innovation with regard to *people* (the range of practitioners and students becoming involved) and *mechanisms* of use (generating opportunities to explore perspectives about diverse topics) is seldom accompanied by innovative pedagogical *goals*. With honourable exceptions, most uses of video explicitly for 'education' or 'learning' accompany iterative rather than ruptural pedagogical change: attempting to re-mediate existing curriculum objectives under the close direction of teachers, or teacher-educators, and remaining oriented towards individual student outcomes. A separate literature on video-activism, conversely, indicates a potential for pursuing less circumscribed and predetermined objectives, yet such work is usually neither oriented towards 'learning' nor linked to explicitly 'educational' scholarship.

In this chapter, we wish to explore the use of video for purposes that are simultaneously emancipatory *and* conceptualised as 'learning'. We build on the sensuous and affective view of video projected in contemporary educational literature, but we investigate people collectively using video to problematise and challenge their own daily realities, not to acquire predetermined knowledge

and skills. Doing so within institutionalised education settings is challenging. Our conceptualisation of 'learning', elaborated below, follows Engeström's (1987) model of *expansive learning*. Like Engeström (2016), our interest in people coming together, shaping the direction of their learning, and producing culturally new forms of knowledge and practice, expresses our serious dissatisfaction with much actual classroom learning. Yet (unlike Engeström) we are unwilling to relinquish formal education as a site for research and practice: we remain interested in how students might learn differently, with teachers and others, in higher education institutions. In this chapter, we seek to explore some of the roles that video might play within such endeavours.

In what follows, we elaborate a worked example of video use in a process of expansive learning, based on data from a larger underlying project. That wider project involved a genuine effort in a definite 'higher education' setting—albeit an unconventional one—at interweaving personal development with institutional transformation. The work, which formed the basis of the first author's doctoral study, is previously unpublished, though an account focussed on participants' developing agency is available as a PhD thesis (Moffitt, 2019). A core insight from Engeström's (2016) work is the need to appreciate learning as an unfolding *process*: people learning transition between different actions, undertaken for different purposes at different times, with the 'meaning' of their learning derived holistically from across the sequence (p. 13). Correspondingly, in what follows, we emphasise how video was used at different moments throughout the sequence of a research-intervention, rather than focussing on isolated instances of use. The methodology of the project we describe was the *Change Laboratory* (Virkkunen & Newnham, 2013). Usually described as a *research-intervention methodology*, we shall position it as a 'pedagogy of expansive learning', given its emphasis on how the latter might be provoked by a researcher-interventionist. The episodes we analyse emphasise how people might use video footage at different moments within such a pedagogy.

Our account focusses on the use of video by particular people, pursuing particular goals and motives at particular times, in ways that contribute to an overarching trajectory of expansive learning. We build on important conceptions from contemporary literature, such as where video is argued to allow "close analyses of ordinary practices" (Broth et al., 2014), to mitigate the "deadening effects" of less sensually or sociologically charged data (Bates, 2015), and to enable the examination of problematic conflict in ways which "audio recording, thick observations or even interviews would not capture" (Harris, 2016). Yet our perspective is explicitly *mediational* and *processual.* Rather than fixating on some aspect of video and exploring the attendant utility for pedagogy, we describe a pedagogical process and explore the different roles that video played throughout—including

emphasising where those roles were unexpected or problematic, and where the usefulness of video seemed to reach particular limits.

The social situation of the project

The project we draw on was motivated by a desire to address persistent practice dilemmas in a UK higher education setting. The Royal School of Military Engineering in Chatham, Kent, has deep connections with the UK defence establishment, and students are seconded military personnel, yet it categorically provides higher education, not solely military training—with our research site being an undergraduate Bachelors in Engineering (BEng(Hons)) programme.

One pole of the visible practice dilemma was an increasingly widespread perception that, to respond to complex, authentic problems, military engineers need to collaborate with external, often non-defence, engineering specialists at the moment and at the location where need arises. The other pole was that such 'boundary-crossing' collaboration is circumscribed by security-restricted computer terminals and policies mandating that expertise is sought from approved sources. The situation, in our view, is a microcosm of wider professional and sectoral issues; yet it was unusually visible in the context of the programme, which specifically emphasises critical thinking, reflection on expertise, and the development of future-oriented problem-solving skills. Prior to the project, in a situation probably reflecting widespread professional practice, the dilemma was semi-regularly resolved *sub rosa*: students used their personal technologies to collaborate with their 'mates' (personal/social/professional contacts), while supervisors turned a blind eye.

The initial idea for the project was to bring together a range of stakeholders to address this dilemma more satisfactorily. Typically, within military education settings, students are the object of change, rather than its subjects—with educational innovation implemented top-down over lengthy timescales (Moffitt, 2019). For this project, we wished to provide students the opportunity to develop themselves as nascent military engineers through working with others to nurture culturally new military engineering practices. Those 'others' participating in the project would include lecturers, whose motivation was to keep up-to-date with technology-enhanced-learning for professional development purposes, and military managers, who voiced enthusiasm for understanding alternative approaches to strategy development. The fact that these people were keen to participate, it should be borne in mind, reflected widespread prior recognition of the *need* for change.

Several additional roles within the project were taken by the present authors. The first author, a teaching-focussed lecturer in the local setting, led the project as part of their studies in a part-time PhD programme at another institution (Lancaster University). The first author thus had multiple roles in the project: as the "interventionist" leading sessions, as one of several lecturers from the Royal School of Military Engineering participating in the project alongside managers and students, and as a PhD student at Lancaster. The second author, an academic from Lancaster who acted as doctoral supervisor for the underlying project, worked alongside the first author to advise on the design and development of the work. The overall description of the project, including how the first author led the research-intervention as an insider-researcher and participants' eventual 'solutions' to the practice dilemma, are described elsewhere (Moffitt, 2019). In the account that follows, which is jointly produced, we are concerned to map how video contributed to the way in which the project unfolded pedagogically, based both on the data collected within the underlying project and reflections on our experiences as "instructional designers" throughout the process.

Our motivation to use video stemmed from a recognition that the project would need to mediate the experiences and vantage points of quite disparate participants. Yet we quickly realised that our challenges would be wider than simply supporting interpersonal group collaboration. Addressing the practice dilemmas we faced would require, among other things, bridging formal systems of military engineering education and external, vernacular practices; engaging with external knowledge in a variety of forms, including those openly contested on the internet and those commercially commoditised; and harnessing challenging discussions about the wider purposes of military engineers and their professional domain. These are all examples of some of the most difficult issues at the horizon of the contemporary scholarship on 'learning', reflecting precisely the kinds of conflicted situations that might drive cycles of what Engeström (2016) has called *expansive learning*. That concept had significant influence on our project's design and analysis, and for that reason some abbreviated background information will be necessary to contextualise the empirical examples of video use that follow.

Conceptualising the mediation of expansive learning

The concept of expansive learning emerges from the tradition of *activity theory* (Blunden, 2010), a longstanding approach to understanding human practice widely used in empirical studies of higher education (Bligh & Flood, 2017). Among other things, activity theory:

- distinguishes between *activities* (sustained, collective human projects) and *actions* (the time-bound pursuit of concrete goals meaningful within activities);

- highlights that the activities of human subjects are *oriented* towards *objects*, material items onto which they project meanings and from which they derive motivation;
- draws attention to how human activity is *mediated* by *artefacts*, other items which come between subjects and their objects to form tripartite relationships;
- emphasises that activities develop historically, with current forms arising from antecedents and further developing into new forms; and
- locates the engine of development as *contradictions* within activity that subjects, who experience them as dilemmas, strive to overcome.

Within that tradition, *expansive learning* is a concept developed by Engeström (1987) to characterise ruptures in activity where acute contradictions are resolved by subjects qualitatively transforming the object—a necessarily collective process that involves going beyond given knowledge and constructing culturally-novel ideas and practices. Engeström (2016) suggests that such an understanding of learning is crucial, since societal challenges increasingly *require* subjects to go beyond the acquisition of predetermined knowledge (the typical understanding of 'learning'). For expansive learning to occur, Engeström suggests, a cyclical movement is required; one that encompasses *expansive learning actions* of the following ideal-types (adapted from Engeström, 2016, pp. 47-48):

1. *Questioning*: criticising or rejecting aspects of established practice;
2. *Analysis*: investigating, representing and explaining the present situation, via:
   a) historical analysis: appreciating its evolution from antecedents; and
   b) actual-empirical analysis: understanding it systemically and relationally;
3. *Modelling*: constructing an explanatory, simplified models to address the present situation;
4. *Examination*: exploring proposed models to establish their dynamics, potential and limitations;
5. *Implementation*: rendering models concrete by applying them in practice;
6. *Process reflection*: evaluating and critiquing the learning process;
7. *Consolidation and generalisation*: embedding models as new forms of practice.

While expansive learning does occur 'naturally', a desire to *stimulate* it underpins the emerging research field of 'formative intervention' (Engeström, 2016). As already established, the underlying project described in this chapter used the *Change Laboratory*—a prominent formative intervention methodology only occasionally used in higher education (Bligh & Flood, 2015). A Change Laboratory research-intervention generally involves groups of around 20 participants, who meet periodically in task-based workshops (Engeström, 2007). We characterise the approach as a *pedagogy of expansive*

learning, since it involves interventionists designing a microcosm for stimulating expansive learning and participating in the process (cf. Virkkunen & Newnham, 2013). Yet, along with an expanded object and newly constructed activity, a central outcome of expansive learning is participants' transformative agency. For this reason, the interventionists' design does not mechanically determine participants' action; an unfolding *deviation from design* is both anticipated within the methodology and actively monitored by interventionists as an indicator of nascent agency that might be nurtured. A comprehensive description of the methodology is beyond the scope of this chapter. Instead, we explicate two specific issues of import for the subsequent narrative.

The first concerns *dual-stimulation tasks*, a central knowledge-production method derived from Vygotsky's experimental work (Wertsch, 2007). Dual-stimulation involves introducing a problem ('first-stimulus') that subjects perceive as conflicting, or solution-less, and an artefact ('second-stimulus') that subjects use to address that problem, thereby increasing their volition (Sannino, 2015). In Change Laboratory task-designs, those stimuli are supplemented by other components: 'mirror-data' (representational materials illustrating practice problems), direction on social organisation (for example, requests to work in sub-groups followed by a plenary), and documenting and recording mechanisms (Virkkunen & Newnham, 2013). Video footage from various sources is a common form of 'mirror-data' within such tasks, while video cameras are a common mechanism for 'recording'. In Vygotskyan experiments, dual-stimulation tasks are used to investigate the *Zone of Proximal Development* (ZPD): the area beyond subjects' independent problem-solving ability where they can only work with cultural assistance (Wertsch, 2007, pp. 181-182). In the Change Laboratory, analogously, those tasks are designed to assist subjects pursuing difficult goals, such that they *together* inhabit and explore the ZPD of their collective systems of activity while exerting and further developing their own agency. Instructional design within the Change Laboratory involves designing tasks such that their goals, towards which the first stimulus directs subjects, relate to the *expansive learning actions* listed above (proceeding from *questioning*). Indeed, one source of the power of the Change Laboratory, as a methodology, derives from its juxtaposition of expansive learning with dual-stimulation (see Moffitt, 2019, p. 84 for a tabulated example). Another is that task-designs are cumulative; frameworks built by participants themselves form second-stimuli for subsequent tasks, and session video recordings are often re-used later as mirror-data.

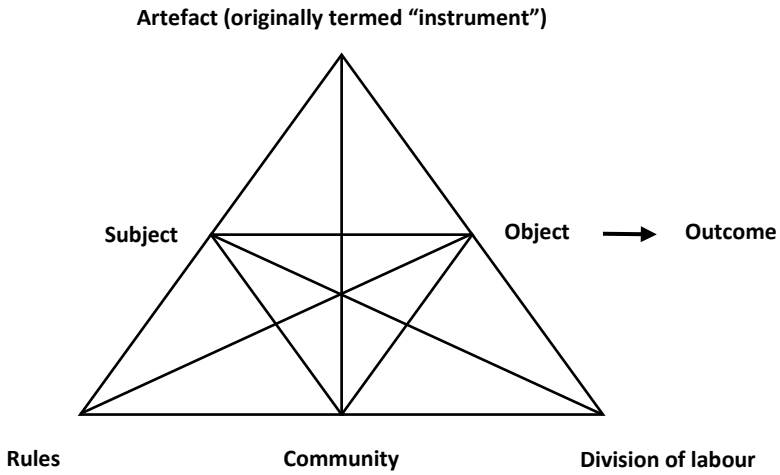

Figure 1. The triangular model of an activity system (adapted from Engeström, 1987, p. 78).

The second issue requiring further explication is our conceptualisation of *artefact-mediation*. A mediational view, as discussed above, conceptually locates artefacts between subjects and objects in active, tripartite relationships. Figure 1 presents a version of Engeström’s well-known triangular ‘activity system’ model. As the second author has previously written:

> That model visually depicts a subject-object system mediated by interlocking artefacts (whether more or less materially tangible), divisions of labour (whether by expertise or authority) and rules (whether or not explicitly recognised). Engeström’s model is widely used for conceptualising [activity], whether for analysing a single ‘system’ or interactions between several. Those analyses typically foreground contradictions, unfolding relationships between systemic elements that support and undermine each other. Contradictions are understood as drivers for change: they are manifest as subjective dilemmas that people try to address, with varying degrees of success, thereby altering attendant forms of collective activity. (Bligh & Flood, 2017, p. 130).

In the Change Laboratory methodology such a view of active, tripartite relationships has significant implications for instructional design: when interventionists provide mediating artefacts (such as ‘second-stimuli’) for subjects to use, the aim is not that subjects focus on those artefacts, but rather that they use them in mediational ways while focussing on the task (Sannino, 2015). Thus, when considering video in the examples that follow, it is necessary to avoid considering it in isolation. To address this problem, we use a fourfold schema, developed by Engeström (1990, p. 188), which *conceptualises mediating artefacts in relation to objects* by highlighting “what”, “why”, “how” and “where-to” relationships. Table 1 outlines that schema, which we use to describe the intended and actual use of video artefacts in the examples that follow.

Conception of artefact	Relation to object
What-artefacts A means for subjects to directly pursue their object.	Identifying and describing objects, including when attempting to construct 'solutions' to problems.
How-artefacts A means for subjects to understand how to achieve their object.	Guiding processes and procedures on, within or between objects.
Why-artefacts A means for subjects to explain their object.	Diagnosing or explaining the properties or behaviour of objects.
Where-to-artefacts A means to model and envision the object.	Imagining potential futures for objects.

Table 1. Relations between artefacts and objects (based on Engeström, 1990, p. 188).

Using video footage in a Change Laboratory project

In this section we illustrate how video can contribute to an ongoing *trajectory* of learning and development. Given our *processual* emphasis, we structure the section to illustrate how video was used in the context of different expansive learning actions. Given our *pedagogical* emphasis, we consider, in each case, both the intention behind the task people were working on and what was achieved in practice. Given our *mediational* emphasis, we deploy the vocabulary outlined in Table 1 to describe the relationships between video, as an artefact, and the emerging object of the expansive learning activity. Video cameras were near-ubiquitous during project sessions, partially for research data collection. Given our current focus on pedagogy, however, we shall emphasise only where footage was used subsequently by participants, and where video was recorded specifically for in-session use.

1. Questioning

Inviting participants to criticise established practice at the outset of a project is challenging, often contravening local norms and jarring with participants' expectations (Virkkunen & Newnham, 2013). The established practices we wished participants to question—wherein they were required to follow prescriptive policies and use security-restricted devices in situations where doing so was frustrating—were well-established in the local practice setting (see the section *The social situation of the project*, above). Our initial instructional priorities were to illustrate practice problems (we had in mind those that would invite the *sub rosa* solutions we described earlier), since we presumed participants would have disparate experiences of those problems; to legitimate *open* criticism of those problems, especially where those with different roles and military ranks were co-present; and to foster transformative agency by provoking emotionally 'felt' reactions (cf. Sannino, 2015). We

convened separate sessions for students, lecturers and military managers, to nurture initial expressions of critique, before bringing participants together in a plenary (Moffitt, 2019, p. 85). Our instructional script—our strategy of intentions and resources for sessions, formally documented yet flexibly deployed in practice—involved deploying tasks (first-stimulus) asking participants to identify problems in learning practices, using paper workbooks (second-stimulus) containing diagrammatic templates.

One pole of the visible practice dilemma was an increasingly widespread perception that, to respond to complex, authentic problems, military engineers need to collaborate with external, often non-defence, engineering specialists at the moment and at the location where need arises. The other pole was that such 'boundary-crossing' collaboration is circumscribed by security-restricted computer terminals and policies mandating that expertise is sought from approved sources.

Video was used as mirror-data. We drew inspiration from prior interventions using footage to encourage all participants—students, lecturers and managers—to accept that practice problems *exist* (cf. Farhangi, 2018, who videoed examples of teacher-student miscommunication), and that they should be considered from different *vantage points* (cf. Virkkunen et al., 2012, who recorded interviews with marginalised students and showed them to teacher-participants). Ethnographic video data of students' routine work with infrastructure engineering systems was recorded prior to the initial sessions, by the interventionist and students themselves (Figure 2). Although doing so was labour-intensive, the resulting resource was, as elaborated below, very useful subsequently. Excerpts for use in the initial sessions were selected by the interventionist. The footage (an example of the established practices on the course that participants might come to question—in this case, showing difficulties encountered when students diagnosed and repaired a water distribution system) was intended to serve as a what-artefact: provoking participants to notice and describe the object on which they would be working within the intervention.

Figure 2. Participants creating and interpreting video footage.

Encouragingly, many manifestations of critique and resistance arose in the separate sessions (Moffitt, 2019, pp. 130-143). Criticism, for example, focussed on frustration with policy, concerns that course practices were 'isolated' and artificially individualistic, and the sense of uncertainty about rule-breaking. Those expressions remained evident in the plenary, one student asserting to the group that:

> "... it [video footage] showed how much expertise we've needed … this stuff is hard to argue with really … it shows we can't just do it in a bubble, we need to either get hold of experts or get better at this ourselves …".

While some of our overall instructional goals were realised, video was nonetheless used in ways that deviated from our plan. Our intention that mirror-data would serve as a what-artefact directing attention to the object was only partially realised, for example: critique was primarily oriented at the (poor) attainment of curriculum objectives, rather than at problematising what people were actually doing. Participants proceeded to identify systemic practice problems—adopting video as a how-artefact—notwithstanding that the object of activity was imprecisely conceived. With reference to the triangular activity system (Figure 1), participants directed their attention more toward artefacts and rules, and the tensions between them, than to the object of activity. We came to believe that the design of the task workbooks (second-stimulus) perhaps encouraged this focus on broader, systemic issues. That observation highlights the importance of recognising how artefacts form constellations within task-designs, perhaps with unintended consequences.

2a. Historical analysis

Historical analysis involves participants exploring how past developments led to the current situation, thereby exposing some "underlying causes" of those issues highlighted during questioning (Virkkunen & Newnham, 2013, p. 84). We devoted one session specifically to this action, jointly

involving students, lecturers and managers. Our instructional priorities were to divulge the historical development of institutional practice and link it to changes in the wider work contexts of military engineers; to engage all participants, who would have been involved to different extents because of their roles, *together* in mapping the practice history; and to provoke more targeted discussion of the object of activity. Tasks (first-stimuli) required all participants to identify "main problems" in a number of examples of historically-embedded practices, including learning to design and manage built engineering infrastructure. Participants identified how problems in activity had arisen through time, while frameworks (second-stimuli) included a representation of the activity system, developed within prior discussion, and a blank 'timeline' template.

Published formative interventions use video in historical analysis *confrontationally*. Clot's (2009, pp. 299-301) *Clinic of Activity* approach, for example, involves individual participants being filmed working in difficult situations; then working individually with researchers to analyse extracted 'traces' of their practice (called "simple autoconfrontation"); before being paired with other participants to analyse each other's traces ("crossed autoconfrontation"). "We rediscover each time", notes Clot, "that the subjects at work carry history and experience that an observer from the outside easily confuses with automatisms and routine" (p. 299). Importantly, Clot's use of video serves as a why-artefact: diagnosing the object.

Like Clot, we aimed to confront participants with their own experiences, yet we could only produce video traces of *students'* practices, reflections on how those were experienced, and consideration of the wider practice context; and we could only present those to all participants collectively. We utilised video mirror-data excerpted from our student-practice footage (described previously); from interviews with selected students from previous cohorts (which we created specifically); and from pre-packaged materials showing scenarios of military hospitals, water and wastewater treatment plants, airfields, and electrical power generation for humanitarian and warfighting tasks in Afghanistan, South Sudan and Sierra Leone. The latter were taken from an in-house archive of past and present teaching materials; excerpts were selected to illustrate historically-changing circumstances and priorities.

In the session, participants recognised that practice problems were long-standing and, importantly, came to relate the criticisms they had voiced in previous sessions more explicitly to the object of activity. One military manager, for example, speculated that the real object of activity had for some time been to maintain a "rite of passage":

> "…it's [video footage] embarrassing really for us [managers]… we're still stuck in the past with some of this [expletive] we've been talking about too… I mean the [learning programmes] that we've delivered on that [video footage] … the same [expletive] year after year after year… it's like a rite of passage… to put up with the same old [expletive] …".

As before, however, participants also used the footage in unanticipated ways. For example, students repeatedly became fixated on the artefacts of activity: focussing on obsolete-looking or otherwise problematic tools, such as UK Ministry of Defence terminals, and suggesting that they be replaced with new alternatives, including social media, online messaging communication and web video, none of which could be accessed on sanctioned defence platforms. As instructional designers we could see that these problematic conditions likely prefigured tertiary contradictions (between historically-embedded activity and new, culturally more advanced forms of activity), arising from participants' desire "to use an advanced method to achieve an objective" (Gedera, 2016, p. 58), even though we had not emphasised that issue in our task design. Once again, video was being used partially as a how-artefact, notwithstanding that doing so was not part of our instructional intention at this stage in the project.

2b. Actual-empirical analysis

In actual-empirical analysis the instructional priority is to assist participants to gradually shift their attention to the systemic: to move from considering particular practice problems to establishing the wider context in which those problems arise. In other projects, video recordings of interviews (Engeström, Rantavuori and Kerosuo, 2013, p. 96) or teaching practice (Teräs, Lasonen and Nuottokari, 2014, p. 42) have served to situate process failure or cultural tension. Such footage is similar to that we used for historical analysis, yet the attendant task-goals and other stimuli are different—reinforcing how the same video can play different mediating roles.

Actual-empirical analysis of current programme activity, with a particular focus on the delivery of built infrastructure, was the instructional focus for one session. Our instructional script involved using video to serve as mirror-data for first-stimulus tasks requiring participants to analyse, in turn, the extent of alignment between particular actions and overall activity, and systemic contradictions within activity. Second-stimuli included generic diagrams illustrating contradictions in activity systems, while 'disturbance diaries' (cf. Virkkunen & Newnham, 2013, pp. 88-89), which we had asked participants to keep prior to the session, were used as additional mirror-data alongside video resources. We intended participants to use video as a how-artefact, to understand typical processes

and procedures of learning to design and manage built infrastructure on the programme—the first time we had actually *intended* them to do so.

In practice, we had largely achieved our instructional objectives by the end of the session, though participants deviated from the planned script at the outset. While we anticipated participants using the video to study processes and procedures, as the actual action unfolded they first noticed and focussed on hitherto unremarked commonalities between their current practice problems and student comments from previous cohorts—using video footage as a what-artefact to corroborate the need for change. One student, for example, made the following statement:

> "… that dude on the [video footage] getting [interviewed] there he wouldn't have known any better than us a year ago … what he was saying about [platforms] being wrong it's what we were saying when we got interviewed, exactly the same … he's showing us the same problems we've got on it [video footage], it's not just us!"

Such action proved important, despite it being a deviation from our instructional script: participants seemingly felt a need to substantiate to themselves that aspects of *social* structure (as opposed to more tangible forms of mediation, such as technology) were actual and longstanding. Only after that corroboration, with video playing a central role, did participants engage analytically with the concepts of social structure (community, rules, and the division of labour) that were set out in the second-stimulus diagrams. Subsequently, participants—including, perhaps surprisingly, managers—started to offer anecdotal evidence, often from discussions with deployed colleagues, about those issues. By the end of the session, participants were deeply engaged with discussing issues of social structure and mediation, identifying their activity's secondary contradictions for themselves (whilst detailed theorisation of contradictions is beyond the scope of this chapter, one example was a contradiction between video media and curriculum objectives—a secondary contradiction between the 'artefacts' and 'rules' elements shown in Figure 1; for more detailed exploration of similar examples, see Gedera, 2016). Our main priority as instructional designers was to ensure that this work, which was quite viscerally emotional, was harnessed to support more reflective thinking in subsequent sessions (cf. Virkkunen & Newnham, 2013, p. 24).

3. Modelling

The action of modelling involves participants constructing simplified, explicit and observable representations of new forms of activity that offer potential solutions to present problems. Two instructional priorities are to ensure, firstly, that participants pay close attention to existing contradictions in activity, since those often implicate *already-emerging* changes and thus potential

starting points for the new model (Virkkunen & Newnham, 2013, p. 93) and, secondly, that the models are constructed in a form—usually graphical—that might serve as a basis for ongoing discussion and refinement. Video may be used to reinforce existing contradictions—Rozario and Ortlieb (2015, p. 299), for instance, used video footage of multi-lingual classroom interactions to help teachers model more culturally responsive classroom strategies. Sometimes video is used to highlight potential models that participants might consider—Montoro (2015, p. 54), for example, used footage of disparate practice from several nations to help participants consider differences in models of working.

Once again, we were able to devote a single session to this action. Our instructional script involved having whole-group tasks focussed, in turn, on the object, mediating artefacts and overall systematic structure of a potential new model; distinct first-stimuli were provided primarily to discourage participants from fixating on mediating artefacts (i.e., technology). Second-stimuli included blank templates, based on Engeström's (1987) activity system model in Figure 1, with which participants were gradually becoming familiar. Mirror-data was created by producing further extracts from the interviews with previous students, which we felt emphasised potentially fertile contradictions in current activity systems.

In the session, participants deviated very significantly from our instructional script—largely rejecting the provided mirror-data (showing interviews with previous students, lecturers and managers), and instead curating their own. Instead of using the materials we had provided, participants collectively decided to return to scrutinising the ethnographic footage on which they had focussed during the sessions devoted to *questioning*. Whereas, in those sessions, that material had served as a what-artefact (as part of the task-design) and a how-artefact (in a way not instructionally scripted), in this instance the same footage became used as both why-artefact (diagnosing issues that the new model should resolve) and where-to-artefact (with some aspects taken as the basis for the new model). In practice the footage was used in ways that seemed to repeatedly oscillate between different foci. On the one hand, footage of participants' own actions-in-progress were used to foreground conflicting motives; on the other, footage showing the attribution of failure to other actors was used to highlight how present dilemmas and contradictions were being aggravated in practice. In one example, a lecturer reacted to failure in footage of action, recognising a need for modelling in the following way:

> "… well that lot [video footage of failing rules and failing division of labour] shows we need to think of something very different now … it doesn't matter how hard it is for us [lecturers] … it matters how much better it is for [everyone, the collective subject] … if we don't do it

[modelling] now then when? … And if we don't what's the next lot [of video footage] going to be showing?".

Previous studies using the Change Laboratory methodology have concluded that action-level deviations from the instructional script (i.e., where deviation remains confined to the goals of particular tasks, without challenging the overall direction of the intervention) can be important for the process of expansive learning, since they can serve to galvanise participants' critical resistance and doubt, which might in turn be nurtured to encourage different conceptualisations of the object of activity (Engeström, Rantavuori, & Kerosuo, 2013). In this instance of action-level deviation, however, the resistance that was galvanised was partially directed towards a sense of institutional inertia; though openness to new conceptualisations of the object is certainly evident. The transcript extract above, from the modelling session, also illustrates how video footage mediates participants' understanding of retrospective and progressive consolidation in the intervention: the lecturer makes both reflective and predictive comments that relate to both short and medium temporal cycles of change, while recognising the wider impact of the concepts requires further development.

4. Examining

Actions of examining involve participants exploring the potential dynamics, and implications of new models. Often that is attempted by selecting and considering test cases, mapping out how new activity systems might deal with those cases, and making comparisons with current practice. In published examples, video footage is sometimes used to illustrate the test cases. For example, Newnham (2017, p. 144) presents participants (teachers) with footage of a student discussing previously-denied feelings of isolation, while Morselli (2015, p. 95) presents to student-participants recent recordings of themselves undertaking vocational training.

Our video footage, likewise, showed the cohort struggling with a task; selected as an example of students clearly seeking help in a difficult situation, we intended the footage to serve as a how-artefact through which participants might focus on issues of procedure. Our first-stimulus tasks suggested considering the implications of, in turn, a short-term field trial and more sustained use of the model. Second-stimuli included theoretical models from the activity-theoretical literature (illustrating interactions between different activity systems and types of systemic contradictions) and template "four-field" diagrams (cf. Virkunnen & Newnham, 2013), which provided axes along which participants were invited to map the different contradictions that they discussed. Figure 3 shows the set-up in practice, with video on the right screen and four-field diagrams on the left.

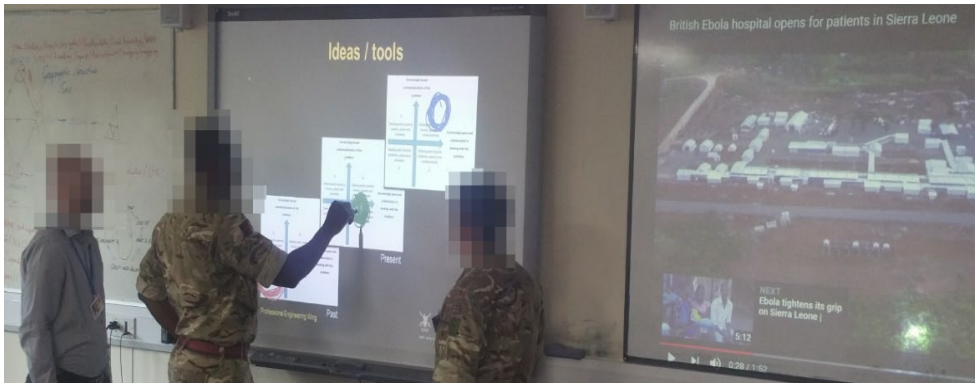

Figure 3. Participants moving between watching video footage (right) and working with four-field analysis (left).

Prima facie, action in the session initially unfolded broadly as anticipated. Yet soon participants started to scrutinise the video to try to discern reasons for practice failure—it served as why-artefact rather than how-artefact. Subsequently, participants tried utilising footage to analyse possibilities for change (as where-to-artefact), at which point they demonstrated palpable frustration. Subsequent attempts to negotiate meaning using the task-stimuli resulted in striking rejection of both the task and room environment. As one participant (a student) commented:

> "… sitting here watching videos on [expletive] going wrong … it's awkward to watch alright but it's not getting us nowhere … let's all [expletive] off to [a remote military training area] … and aggravate some [expletive] real contradictions … to show who's to blame and who's not …".

Participants clearly felt a continuing need, when examining their new model, to understand current failure, and perceived the materials provided as an insufficient means for pursuing such understanding. The session was anxiety-inducing for us as interventionists; notwithstanding that the intervention was intended to empower participants, the turn of events was unexpected and we worried that our design had been lacking. It left us in an uncertain position as instructional designers, yet in retrospect the session would turn out to be a crucial moment in the development of participants' agency.

5. Implementation

Implementation involves participants nurturing aspects of new activity in reality, further unpacking their model's potential for overcoming systemic contradictions by discussing it with relevant colleagues not involved in the intervention or piloting the 'new' ways of working (Virkkunen & Newnham, 2013). Footage from the intervention is sometimes used to mediate conversations

between participants and colleagues (Barma et al., 2017), while video can be used as a means of recording the implementation efforts (Ripamonti and Scaratti, 2015).

At this stage our project had become, as described above, instructionally destabilised, with participants wishing to undertake fieldwork to further aggravate contradictions in their own ways. Three already-scheduled excursions in field locations were fortuitously identified, where attending participants (unfortunately not including managers) might take implementation-related action, with a subsequent session as a plenary. Our instructional script involved a task (first-stimulus) asking participants to implement parts of their new model and compare it against current practice. Second-stimuli included activity diagrams from earlier sessions, while mirror-data included current policy documents. For the excursions, materials were reproduced in a stapled workbook with spaces for students' fieldnotes. We did not provide video recording equipment, since participants preferred to use their personal smartphones.

During the excursions, to a wastewater treatment site in a rural area, students took charge of exploring how remote collaboration might work. Reinforcing continuity with the intervention, participants decided, using portable clipboards, to mimic the information ecology from the room; they also built a tongue-in-cheek triangular 'activity system' on the ground, using sticks gathered from the woodland. Participants explicitly discussed the goal of generating their own mirror-data. Subsequently, in the plenary session, students explained their materials to managers (Figure 4).

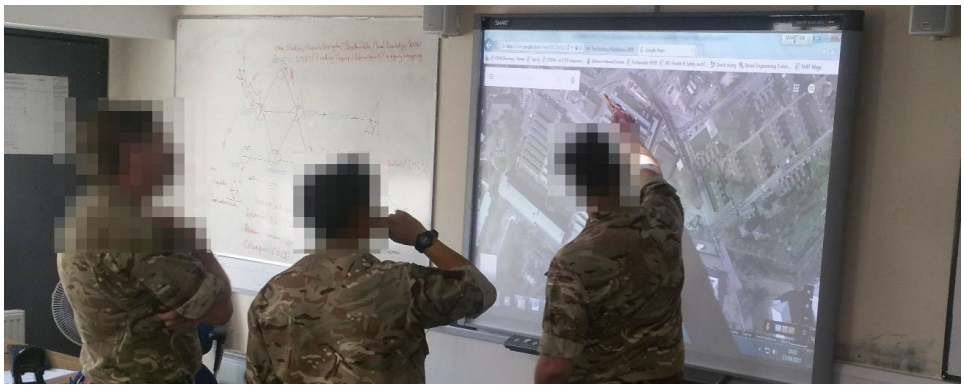

Figure 4. Students explaining their video mirror-data.

Initially using the footage as why-artefact, to diagnose the properties of the new activity, students quickly came to realise the power of what they had produced and to fervently advocate its use as a where-to-artefact, to examine the potential for consolidating change for future students:

> "…there was loads wrong [motions to video] when you cross-map what we done with real life with learning [sic]… we won't cope if things change if we go backwards… this is our evidence

> of what we've tried, what works, what doesn't work… so if the next lot [future participants] need it they can look and we went out and did it and we videoed it and it can't be argued with… so other people can have a go now and see if they can keep it going".

At this point, then, video footage mediated an emphasis on sustaining the knowledge produced in the intervention. Moments like this were important because they demonstrated video mediating moments of both visceral and reflective action (cf. "the dialectic of close embeddedness and reflective distancing"; Virkkunen & Newnham, 2013). In preceding sessions, our worries that video might promote only the visceral led us to design other task elements to support reflection. Participants explaining their own video to others proved an effective mechanism for connecting both kinds of moments, one that we had not anticipated in our instructional design.

6. Process reflection

Process reflection involves looking back over the intervention: evaluating the sequence of preceding actions. Doing so might involve participants discussing their developing conceptualisation of activity; the extent of their success in developing and refining new models; whether there are emerging consequences within actual work practice; their feelings about how they are developing individually; and how they are working collectively to exert change (Virkkunen and Newnham, 2013). The attendant use of video is, surprisingly, seldom discussed in published interventions, though participants might plausibly revisit footage with which they are already familiar, or reflect on excerpts from preceding session recordings. Reflective discussions may include the developmental value of different types of contradictions within and between activity systems (discussed by Yamagata-Lynch, 2010, p. 24; illustrated in Figure 5).

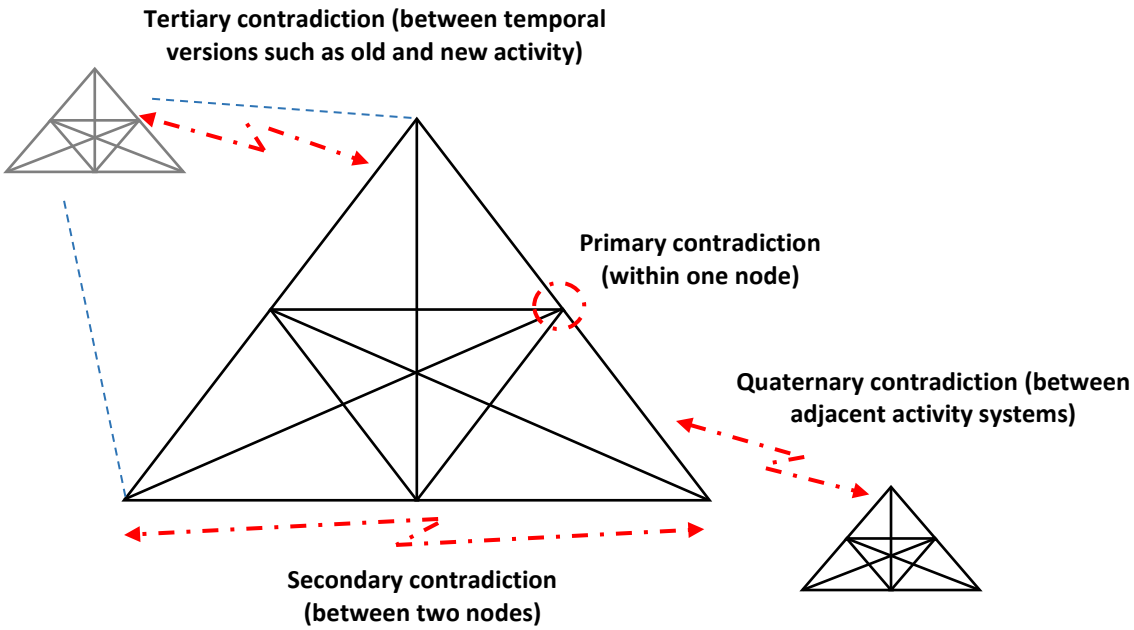

Figure 5. Four types of contradictions in and between activity systems, adapted from Yamagata-Lynch (2010, p. 24).

We allocated a single session to process reflection, with a deliberately flexible instructional script; to a significant degree, we anticipated delegating agency to participants. Having excerpted footage from session recordings, and having double-checked the convenient availability of video resources already used earlier, we provided task-goals (first-stimuli) focussed on the past and future of the activity, and, for the purposes of supporting comparison, analytical resources (second-stimuli) comprised of diagrams established and annotated previously.

In practice it was *students* who took charge of selecting and using task-stimuli, perpetuating the division of labour established in the preceding session. Video footage was used to mediate a repeated oscillation between moments of identifying the future activity system (as where-to-artefact) and reiterating the consequences of not sustaining change (as why-artefact: emphasising the diagnosis of current practices). Students expressed a desire to negotiate and formalise personal roles and responsibilities for sustaining change, in one instance confronting a manager with recordings of expressions of scepticism from early in the project. He responded as follows:

> "…I think what you're diplomatically trying to say and what you're showing me in that [footage] is that I wouldn't accept it [need for change]… but I do, I just don't think we should roll over and accept that we need to do it this way… otherwise we'll just have a different kind of [expletive]… if you're not a bit curious about maintaining these changes you're making,

you'll just end up with a different kind of [expletive] … At least I was honest, but that might be because you've got me on video [laughter]…".

Such incidents reminded us of examples documented by Virkkunen and Newnham (2013), wherein a teacher critically re-examines her own teaching after seeing footage of herself speaking (p.79). In such cases, video mediates a "dialectic of long-term and short-term cycles of change" (ibid.): as proposals are incorporated into people's daily realities it is important that they are linked to both the realities of everyday practice and to how change and development are sustained (p.24). The use of video to mediate this dialectic only became evident in the later stages of our project.

7. Consolidation/generalisation

Actions of this type attempt to embed and stabilise models of activity developed in the intervention. Doing so might involve attempting to refine and clarify any terminology developed; crystallising proposed processes into forms usable by others (perhaps as documents or in technical systems); and negotiating necessary organisational and policy arrangements with relevant stakeholders (Virkkunen & Newnham, 2013). Video footage can mediate such actions in various ways, including by promoting the new forms of working to potential stakeholders (Morselli, 2018).

At this stage of our project, we wished to continue progressively accentuating the participant control of sessions. Our main concern was to avoid any perception of stakeholder negotiation being delegated to manager-participants—in the event, an unfounded concern. Three sessions were associated with consolidation/generalisation: the final 'regular' meeting and two follow-up workshops that took place, respectively, three and five months later. Our task-design for the 'regular' meeting comprised first-stimuli asking participants how they might influence local policies, and second-stimuli providing examples of current plans and previous institutional proposals. We did not provide new mirror-data at this stage. The follow-up workshops had no explicit task structure.

The core consolidation/generalisation idea developed was that of a "resource bank". Participants (especially students) wished to curate a set of resources (including videos) for use by *future* cohorts, who might benefit from their insights and "keep up the pressure" on institutional management. The idea, incipient in the process reflection session, was significantly developed in the last 'regular' meeting, and participants had developed the "bank" when follow-up workshops occurred.

In consolidation/generalisation actions, many previous examples of video footage that had already been seen in previous sessions (and which participants were re-viewing to consider their inclusion in

the “bank”) were regularly used in ways corresponding to all four conceptions of artefact-mediation we were using (Table 1). Video was used as:

- what-artefact: describing the “mission” of the proposed ways of working;
- why-artefact: explaining the reason for working this way (emphasising negative lessons from earlier approaches);
- how-artefact: explaining to future participants how to conduct their own intervention; and
- where-to-artefact: discussing future possibilities and emphasising that the suggested ways of working were “work in progress”.

The idea of using video footage to normalise and legitimate change was envisioned by participants as a means of helping mitigate potential regression. Referring to footage of their fieldwork (Figure 6), one student commented:

> “…we got the mirror material of our own… if we can show them this hard stuff [video footage] evidence of why we need to change and what we did… they can’t deny that… we can say instead here’s the video… we kept saying it was [expletive] but here’s what we couldn’t do until we tried… we went and did it [motions to video]...”.

Figure 6. Screenshots of fieldwork video footage.

Echoing our own previous realisation (see *Implementation*), the student was arguing that asking future cohorts to consider highly localised, visceral experiences might mediate moments of reflection *if* accompanied by an appropriate narrative. By the end of the project, participants had come to consider video as an evidence base for their narrative, which would be projected via the resource bank (cf. “hard stuff”, above). While this view of video is discussed in the scholarship in terms of intervention design—for example, Bligh and Flood (2015) observe that “footage and other

image-heavy media are considered useful for […] conveying that problems exist *undeniably*" (p.156, original emphasis)—our work shows participants themselves eventually coming to adopt a quasi-instructional role and deploying their own video within pedagogies of expansive learning.

Concluding comments

We commenced the chapter by celebrating the increasing prominence of video in educational settings. Yet, we argued, common conceptions in the pedagogical literature routinely focus on video itself rather narrowly. We suggested that doing so has several drawbacks: occluding, in turn, that how people use video is closely intertwined with their goals; that many stated objectives for using video are fairly conventional; and how, in real pedagogy, the roles of video shift and develop, contingently, alongside other aspects of practice.

By contrast, our chapter presented an unfolding narrative focussed on pedagogy. We documented an example of a project with unconventional aims—intertwining personal development and institutional change—and adopted a *mediational* and *processual* form of exposition: focussing on pedagogy and thereafter tracing the roles played by video within its contours. We now conclude by highlighting some particularly salient points.

Firstly, *video is always part of a constellation of artefacts mediating pedagogy*. Teachers and students choosing to use video should strive to recall that it *will* (not 'might') be used *with* other artefacts: the digital and analogue; tangible, virtual and conceptual; personal and professional; those furnished by the course and those originating from outside. As well as evaluating video *against alternative means*, it is necessary to do so *in relation to those means it complements*. Video is most effective where contributing to, and advancing, a well-aligned mediating constellation. Some examples of productive alignment in our project are obvious, such as that between video and the four-field diagram in our *examining* session. Others are more subtle: think, for example, of how the verbal framing by students, in the *implementation* session, assisted other participants to use it. Conversely, artefact constellations can be mutually undermining, such as where the workbook design in our *questioning* sessions restricted how participants engaged with video footage. Successful pedagogy can be better fostered by consciously considering the constellation of mediating artefacts, rather than focussing on video in isolation.

Secondly, *video use is regulated by the goals of those using it*. For us this point is axiomatic, and we commenced our account by arguing the point. Yet our narrative highlights some important additional implications. One implication is that, where goals are poorly understood, or where

students and teachers have different goals, video is likely to be used in unanticipated ways. The point, however, is not so much a normative prescription for teachers to impose unambiguous goals as a call for keeping goals in mind; in our project (for example, during *actual-empirical analysis*), we occasionally found ourselves 'catching up' with the goals of students—which, notwithstanding that we had failed to anticipate them, were legitimate. Another implication is that the 'same' video can be used differently in relation to different goals, as evidenced by our repeated deployment of footage in successive sessions.

Thirdly, *people build emergent relationships with video artefacts*. The pedagogically-oriented narrative of our chapter exposes how relationships with video artefacts unfolded over successive sessions. Rhythms and repetition in video use enabled participants to build relationships through different encounters. Where students used footage of their practice to nurture initial critique (*questioning*) and explore historical practice relations (in *historical analysis*), they *imbued* it with practical meaning in the project; an imbued meaning that they subsequently recalled by direct verbal reference to the footage itself—even when the footage was not visible on-screen, and even many weeks later. By the *consolidation/generalisation* sessions, participants were openly expressing their (developed) relationships to the video: it had become a vehicle for them to express their ideas to others (in their "resource bank"). Existing literature highlights affective relationships with self-created footage, yet does not emphasise how such relationships can be constructed when *watching* the footage (or that meaningful relationships can also be built with *others'* footage by watching and discussing it).

Sometimes, as participants' occasional frustration reminded us, video reaches certain limits as a pedagogical artefact; it is not the best tool for all tasks. Yet, under many circumstances, video plays useful roles in pedagogical processes. In this chapter, we provided one example of a project wherein video use was incorporated systematically and methodologically. Our account resolves that—where video is recruited into a well-aligned constellation of mediating artefacts, where the goals of those using it encourage purposeful engagement, and where pedagogical design enables participants to *construct* meaningful relationships with footage over time—there is a good warrant for video pedagogy, which can play a useful role in the development of students, both individually and collectively.

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